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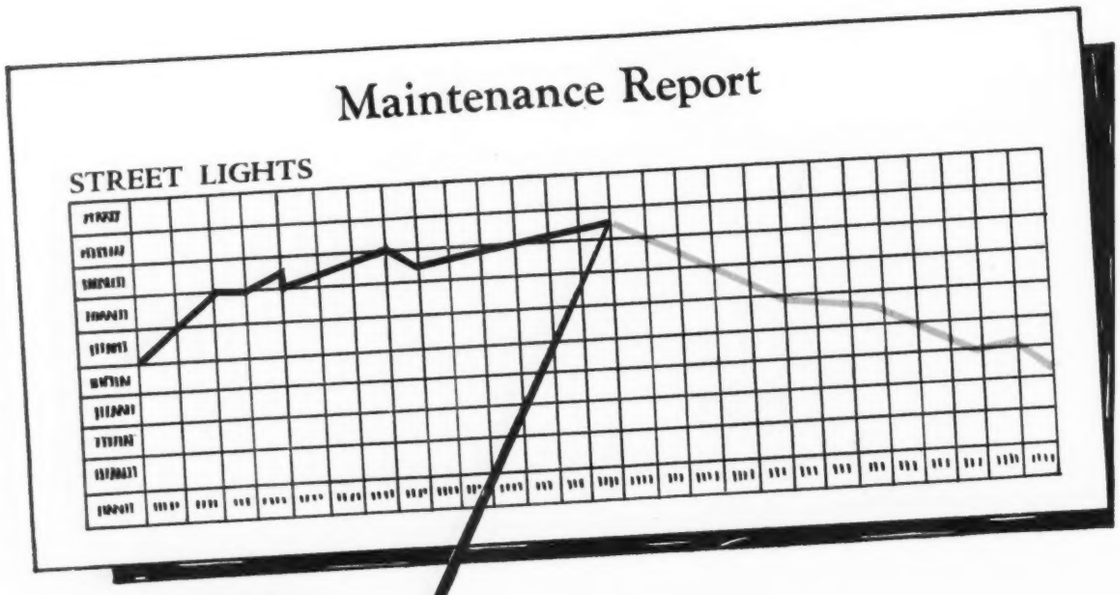

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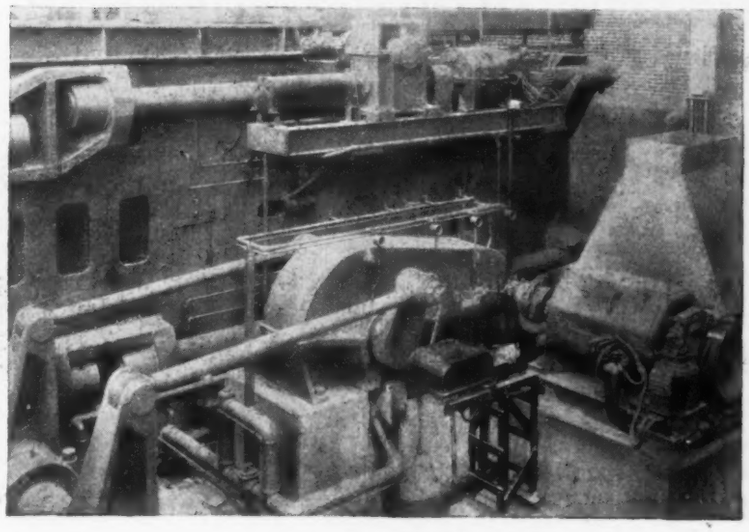

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NOVEMBER 7, 1931

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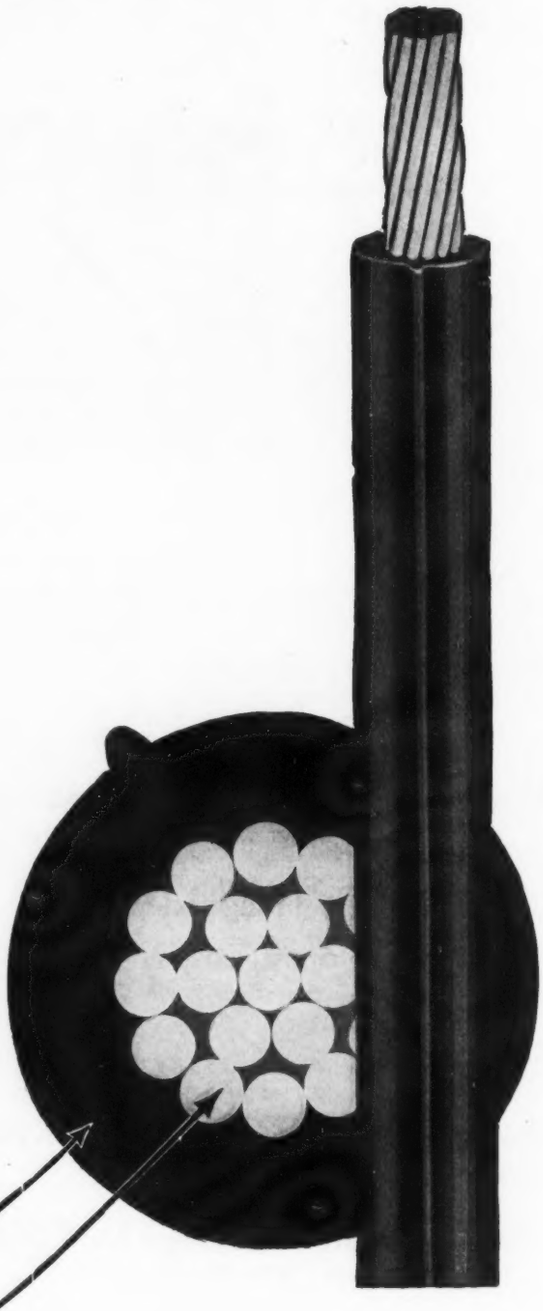

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ELECTRICAL WORLD

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for the Week Ending

November 7, 1931

Lord Macaulay said that, "No one can say that Christianity is a failure, it has never been tried." His famous remark applies with equal force as a reply to those critics who cry out that state regulation of the public utilities is a failure.

FRANK P. MORGAN,
Alabama Public Service Commission

Commission yields in New River case

—**New River case revived again** as the efforts of Attorney-General Mitchell and Senator Walsh of Montana bring intimations of consent by Federal Power Commission to have a court rule on navigability questions—*p. 809.*

—**Fighting both sea and sand** was the unceasing problem of construction engineers in bringing an underground network system to Atlantic City. Entire system is virtually submerged, but vaults are dry—*p. 822.*

What are the merits of ultraviolet?

—**The truth about ultraviolet** is hard to establish and conflicting claims puzzle the would-be user of artificial sources. Here is a viewpoint from Dr. Luckiesh based on his studies—*p. 829.*

—**Give regulation a fair trial** is plea of state commissioners who concede weakness on the part of commonwealths but see a better job done if funds and public support are forthcoming—*p. 816.*

Capital return should not be lowered

—**Return on invested capital** should not be lowered is warning of utility rate consultant, whose view is that property yield must be independent of current money costs—*p. 825.*

—**Merchandising law is upheld** by Shawnee County District Court in Kansas. While case will doubtless be appealed to State Supreme Court, anti-utility measure passes in first legal test—*p. 806.*

Improved handling of customer service

—**Furnace labor cut 90 per cent** by introduction of electric carburizing in manufacture of automotive metallurgical specialties. With large-volume continuous production, the well-designed electric installation is found to be supreme—*p. 827.*

—**Efficient telephone service** for handling customer calls has been made a highly specific performance in Buffalo. Monitored training assures continued improvement. Callers usually speak to but one person—*p. 834.*

Stimson Now Declares Federal Authority on Water Power Paramount

ANSWERING formally the request of Chairman Frank P. Walsh of the New York State Power Authority that the points at issue between the federal and state governments over the St. Lawrence hydro-electric project be adjusted before negotiations are begun with Canada for a treaty to govern the development of the waterway—a request to which Mr. Walsh seems to have thought Washington would accede (ELECTRICAL WORLD, October 31, page 762)—Secretary of State Stimson this week sent to Mr. Walsh a letter in which he said:

"Whatever the rights of the State of New York may be in respect to any electric power developed by the navigation project on the river along the international boundary, the utilization of that electric power must in the end depend upon the authority and permission of the federal government."

Asserting that the Power Authority's plans "must depend upon the opportunities offered by the treaty" and that "any development project must also come before Congress for authorization and appropriation," Secretary Stimson added:

"Under these circumstances, and particularly with the whole project in as early a stage as it now is, I see no useful purpose in definitive agreements at present on the subject."

Governor Roosevelt is reported to be "surprised" at the positive nature of Mr. Stimson's statement, and a long-threatened political issue of importance affecting the interpretation and constitutionality of the federal water-power act may have been started on its way to clear definition.

▼

St. Lawrence Board Ceases to Oppose Private Line

BECAUSE IT RECOGNIZES the importance of providing employment for 1,500 men in the present emergency, it says, the Power Authority of the State of New York has withdrawn its request that the Public Service Commission withhold approval of the New York Power & Light Company's application for the right to construct electric lines that will provide continuous transmission from Albany to New York City.

Chairman Frank P. Walsh made his position clear in a letter dated October 30, addressed to Chairman Maltbie of the Public Service Commission. He, however, laid emphasis in his letter on what he regarded as a contradiction in statements made by the Niagara-Hudson Power Corporation regarding the transmission line. Six months before the application now pending was made the company submitted a plan for a transmission line designed to utilize St. Lawrence power. Engineers of the Power Authority declare the line is virtually identical with the one for which approval is now sought, although, Mr. Walsh says, it is asserted by Floyd L. Carlisle, chairman of the Niagara-Hudson, that the latter interconnection is purely a local enterprise and would not be suited to transmission of St. Lawrence power to New York City.

Mr. Walsh in his latest communication to the commission stipulated, therefore, that "if the proposed transmission line, when erected and equipped, does not reasonably meet the requirements found necessary by the Power Authority of the State of New York and is not adaptable to its plans, then no claim can or will be made by the companies for the cost or value of said transmission line in any contract or contracts subsequently negotiated by the Power Authority with said companies; nor in any condemnation proceedings to secure rights-of-way for the use and purposes of the Power Authority in constructing its transmission lines." This stipulation will probably necessitate further negotiation and elucidation before acceptance by the Niagara-Hudson Power Corporation and its subsidiary.

▼

THROWING NEW LIGHT ON AN OLD FRIEND

—Keystone View Co.

The new floodlighting system of the Statue of Liberty, designed by Westinghouse, began to operate on October 26, a photo-electric tube in the goddess' hand, an aërial flashlight bomb on an army plane and Mlle. Josée Laval at the top of the Empire State Building all playing a part in the apparition.

▼

I-T-E Forms National Plan for Unemployment Relief

AN UNUSUAL AND INTERESTING plan for unemployment relief is announced by the I-T-E Circuit Breaker Company. According to A. Edward Newton, chairman of the board, 2 per cent of the gross sales of this company for November, December, January, February and March will be donated to the relief organizations of the communities in which the sales originate. Published prices will not be modified and a minimum limit per order is placed at $100.

A special fund of $25,000 has been deposited with the Fidelity Philadelphia Trust Company from which, within ten days after recepit of each order, a check will be sent to the local relief committee in the community in which the orders originate. It is the hope of this company that other manufacturers may be led to adopt this plan or a modification of it as a practical means by which industry may supply money needed to ameliorate the condition of the nation's unemployed.

▼

Kansas Merchandising Law Upheld in County Court

CONSTITUTIONALITY OF THE Kansas law passed this year denying to public utilities the right to sell appliances and equipment was upheld October 29 by the Shawnee County District Court in test suits instituted by ten Cities Service company subsidiaries. Appeal to the State Supreme Court is being taken.

The County Court held that a reading of the entire act could "leave no doubt that what the Legislature was intending to prohibit was the manufacture and sale of merchandise by utili-

ties." It ruled that the state has the power to take away from the utilities any or all of their corporate franchises and that under this power the right to sell appliances could be denied. The Cities Service Company had claimed that the sale of equipment and appliances for the use of natural gas and the servicing and repairing of the articles were incident to adequate and proper distribution and sale of fuel. It also contended that the terms of the act were ambiguous.

▼

Pacific Gas & Electric Riparian Damage Suits

A REHEARING HAS BEEN granted by the California Supreme Court to the Pacific Gas & Electric Company's subsidiary, the Mount Shasta Power Corporation, on the court's recent decision which made permanent a temporary injunction granted L. P. Joerger, a farmer with land riparian to Hat Creek. The injunction restrained the power company from diverting the waters from Hat Creek in the operation of its Hat Creek power house No. 2, which has been inoperative since the granting of the injunction. (ELECTRICAL WORLD, October 17, page 678.)

A decision in favor of the Pacific Gas & Electric Company has been handed down by the Third District Court of Appeals of California, reversing the Shasta County Superior Court's award of $85,000 to two claimants for damages said to have been caused on land riparian to the Pit and Fall Rivers. The decision may affect three judgments already rendered in which awards totaled $141,630. Four additional similar cases are still on the appellate court calendar.

▼

Utility Turns from Hydro Plans to Steam Extension

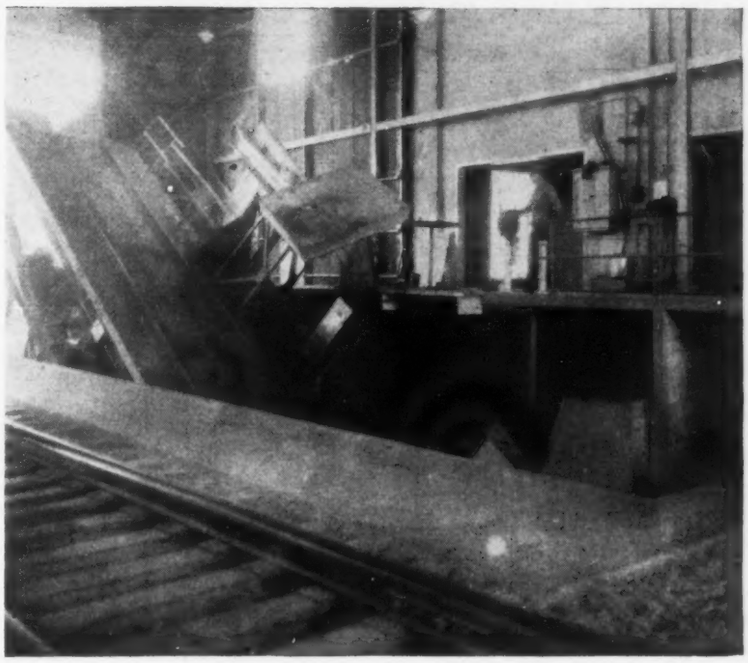
NO LONGER INTERESTED in the immediate development of hydro-electric power in West Virginia because of what is regarded as a "hostile attitude" to such development on the part of the people of the state, evinced in the passage of tax bills, the Appalachian Electric Power Company has made local announcement that it will make no effort to go ahead with the two large plants it had intended to build on the New River. Inasmuch as the State Supreme Court has found the state water-power law passed in 1929 unconstitutional, highly placed spokesmen for the company are quoted as maintaining that there is now nothing to prevent its embarking on the project if it thought doing so would be advisable or profitable.

"But," these officials go on to say, "our present plan is to develop the use of steam for power production. Improvements and refinements to increase efficiency of coal-burning machinery are constantly being made. We are taking advantage of them. We will continue to burn coal." Water-power plants, such as the small units the company may build under federal license at the United States dam sites in the Kanawha River, will be used only to furnish energy in excess of base loads or as auxiliaries to steam plants.

Improvements and extensions to the company's steam plants at Kenova and in the Huntington territory are to be undertaken in lieu of the hydro projects. Early expenditures are to approximate $1,000,000, the work extending over eighteen months.

George M. Alexander, president Monongahela-West Penn Public Service Company, Fairmont, has made a statement of similar purport. He said: "The West Penn's interest in the whole subject of the future of water power in West Virginia is closed. How, when, by whom and under what terms and conditions the development of hydro-electric resources of the state shall be made is a matter of state policy to be fixed by the people of the state through their duly constituted officers."

ELECTRICITY SPEEDS WHEAT FROM RAILS TO MILL



Motors and automatic controls of Westinghouse make actuate a Link Belt wheat unloader at Toledo, Ohio, when a photo-electric cell in a pit beneath the tracks permits the tilting back and forth of the box car to discharge the last bushel of grain. From 4,000 to 6,000 tons can be emptied in a day at one-fifth former cost.

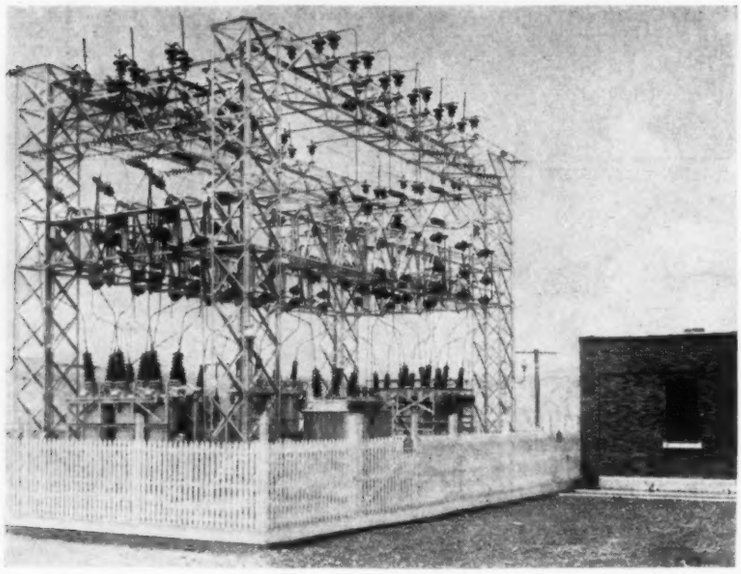
▼ ▼ ▼

Municipal Electricians Condemn Substandard Cord

"HIGH SPOTS" at the thirty-sixth annual convention of the International Association of Municipal Electricians, held at Jacksonville, Fla., October 27 to 30, included adoption of the 1931 National Electrical Code, steps to cooperate with Dr. M. C. Lloyd, chief of the Safety Section, United States Bureau of Standards, to draft a standard electrical ordinance to be submitted to the 1932 convention; the naming of a committee to draft a model radio interference ordinance for submission to the next convention, and agreement that widespread use of substandard flexible cords constitutes one of the gravest problems in bringing about maximum safety in the use of electricity. The electricians pledged themselves to strive to educate the public in the use of standard labeled cord.

Officers elected were: President, H. H. Berry, Springfield, Mass.; vice presidents, W. B. Griffis of Indianapolis, John S. Luckie of Houston, W. H. Greenlaw of Beverly, Mass., and Frank Shinnen of Atlantic City. W. H. Harth of Columbia, S. C., was re-elected secretary and W. F. Qualls of South Bend, Ind., treasurer. St. Louis was selected as next year's convention city.

Building a Substation in Acid-Impregnated Area



AN AUTOMATIC 69,000-volt substation was recently erected by Allied Engineers, Inc., for the Tennessee Electric Power Company upon a huge slag pile in the heart of a desolate valley in southeast Tennessee known as Copper Basin. It transforms power from the Ocoee No. 1 and Blue Ridge hydro plants for use at the mines and other industries in the valley, which is rich in copper and iron ores and produces much sulphuric acid. The main structure is of black steel heavily painted to resist acid fumes, and all ground copper is heavily coated with acid-resisting compound. No galvanized steel is employed. Fiber conduit is incased in concrete, and the yard fence is of wood.

▼ ▼ ▼

Coke Company Helps Dividends at Louisville

WEDNESDAY, THURSDAY and Friday of last week were devoted by the Federal Trade Commission to the resumption of its inquiry into the Standard Gas & Electric Company and its subsidiaries and affiliates in the Byllesby organization. Affairs of the Louisville Gas & Electric Company were gone into at much length. Some of the features of its physical set-up, such as the hydro-electric plant operated in connection with the federal government's dam on the Falls of the Ohio and the tie-in with the Union Gas & Electric Company of Cincinnati, permitting an economic advantage to be taken of an hour's difference in time, came in for commendatory mention on the part of the commission's witnesses.

The Louisville company was formed in 1913 at the instance of H. M. Byllesby & Company. It took over the properties of three predecessor companies and shortly thereafter absorbed three more companies. The total purchase price for these properties, Examiner Wilcox said, was $17,450,534, or about $500,000 more than the value of the properties a short time before on the books of the predecessor companies.

In 1929, Mr. Wilcox said, the Louisville Gas & Electric Company bought 95 per cent of its electricity requirements from two affiliated companies, the Kentucky Coke Company and the Louisville Hydro-Electric Company. The Louisville company paid the Kentucky Coke Company 1 cent per kilowatt-hour for electricity in that year, he said, and the Louisville Hydro-Electric Company 2 mills per kilowatt-hour. The Kentucky Coke Company was paid also $1,000,000 for standby service in 1929. The Kentucky Coke Company showed average returns on total investment of 43.78 per cent a year from 1919 to 1928. Earnings of the coke company on its common-stock equity had averaged 148.71 per cent a year, Mr. Wilcox testified. The consolidated statement for the entire Louisville group of companies, however, showed the return for the group to have averaged 9.83 per cent on the common-stock equity.

The Kentucky Coke Company operated almost entirely on funds obtained on open accounts maintained among the companies in the Louisville group, Mr. Wilcox testified. It has issued 500 shares of common stock, nearly all of which is held by the Louisville Gas & Electric Company of Delaware, the holding company for the Louisville properties. In 1926 the coke company set up out of its surplus a fund of $1,000,000 to the credit of the Louisville Gas & Electric Company of Delaware, in addition to dividends and rentals paid to that company.

Mr. Wilcox next took up the Louisville Hydro-Electric Company, which leases the dam at the Falls of the Ohio from the federal government for $95,000 a year. This company, Mr. Wilcox said, operated at a deficit of nearly $600,000 up to the end of 1929. Its liabilities consist largely of $8,794,523 owed to the Louisville Gas & Electric Company of Delaware.

The next hearing will be on Monday, November 9.

▼

Cove Creek Dam Included in Muscle Shoals Plan

HEATED ARGUMENT is said to have preceded a decision by the Muscle Shoals Commission, functioning under the triple authority of President Hoover, Alabama and Tennessee, to recommend that provision for building the Cove Creek Dam be included in any legislation intended to straighten out the Muscle Shoals tangle. Mercer Reynolds of Chattanooga, a member of the commission, is understood to have insisted that with this dam in operation a large amount of energy would be diverted from Tennessee into Alabama during low-water periods. His plan was to build Cove Creek Dam as a separate navigation and flood-control project and install turbines as needed.

Walter M. Bonham of Knoxville in a speech before the commission insisted that the states receive a right of recapture at the end of 50 years, in the same manner as the Federal Power Commission does.

▼

Oregon's Governor Gives His Views on Water Power

STATES REPRESENTED at a Western governors' conference held at Portland, Ore. last week were urged by A. E. Clark, representing Governor Meier of Oregon, to help bring about federal development of hydro-electric resources as well as the right of individual states to effect development of intrastate rivers which pass through portions of the public domain. Mr. Clark said that the federal government is encroaching upon the police power of the states by its regulation of water-power projects. The condition should be changed, he asserted, because virtually all the Western power sites capable of economical and satisfactory development by municipalities or other interests are within the federal domain.

Federal Power Board, New River and Niagara Falls

A WASHINGTON REPORT says that, under pressure from Attorney-General Mitchell and Senator Walsh of Montana, the Federal Power Commission has agreed to refer the long-controverted question of the navigability of the New River in Virginia to the courts for settlement. In its refusal of a minor-part license to the Appalachian Power Company to construct a dam near Radford, Va., the commission held that the New River contributed to interstate commerce and maintained that its decision could more properly be based upon the section of the water-power act dealing with that phase than upon the question of navigability. Two members of the commission, Frank R. McNinch and Claude L. Draper, however, supported a proposal that the commission reverse a finding of the former commission that the river is non-navigable.

The Department of Justice also is now desirous to meet the power company's suit to force the commission to grant it a minor-part license on the ground of navigability as well as on the ground that the New River, as principal tributary to the Kanawha, is a serious factor in interstate commerce.

The commission has set a hearing for December 8 at Washington on the matter of permitting the Niagara Falls Power Company to continue the additional diversion of 275 cu.ft. per second from the Falls which is being allowed under a temporary license issued in 1928 and extended from time to time, the last extension running until August 31, 1932. This hearing also will take up the matter of what value, if any, can be allowed for water rights in the fixed-capital account, it was stated in a memorandum issued by Chairman Smith. This value for rights obtained with industrial properties along Eighteen-Mile Creek has been included by the company at $1,500,000.

▼

Municipal Tax on Utility Income Opposed in Oregon

MUNICIPAL TAXATION of the gross revenues of utilities does not meet the approval of the Oregon State Tax Commission, and the members of this body have advised Salem authorities that the contemplated enactment in that city of an ordinance providing for a 2 per cent tax of this kind will not only endanger the equilibrium of the general tax structure of Oregon but will in all probability be found unconstitutional.

"The whole principle of such taxation is wrong," Tax Commissioner John Carkin asserts. "It is all very well for the city of Salem to contend that its proposed tax ordinance exempts the gross revenues of utilities obtained beyond corporate limits, but what about the general tax structure of the state? It stands to all reason that, although the municipalities demanding such taxes will benefit from the revenue thus derived, the utilities so taxed must perforce include their entire system properties when they begin to figure such expenses. If the municipalities demand a special tax from the utilities, then the utilities are just as surely going to ask more money from the city consumer than they do from the urban customer."

▼

Mobile Refund Refused by Alabama Supreme Court

ANOTHER STAGE was reached recently in the test case by which residents of Mobile, Ala., have sought to force the Alabama Power Company to apply to its bills for 1928 the A3 rate then in force in other Alabama cities of 7,000 and more persons, instead of the higher rate charged by the predecessor company which the Alabama Power Company took over in October, 1927. About $200,000 is involved in the decision.

Two courts have affrmed that the customers were overcharged, but the Supreme Court of the state now overrules them and remands the test case for a new trial. It holds that the rates of the old company in Mobile were binding until changed by the Public Service Commission, and that this was the case when the rates were higher than those of the purchasing company just as it would have been the case had the rates been lower.

▼

California Commission Disapproves Stock Issue

HOLDING THAT a new issue of common stock requested by the California-Oregon Power Company would serve automatically to transfer the control of that company from preferred-stock owners, in whom control now rests and whose holdings represent the largest investment in the company, to owners of common stock, the California Railroad Commission last week refused to give its approval to an issue of new common stock requested by the directors of the company. This application asked permission to issue 59,411 shares of common stock without par value in exchange for the outstanding 59,511 shares of common stock having a par value of $100 each. In addition, the company asked leave to issue at $25 per share

▼ ▼ ▼

BOSTON CITY HOSPITAL FULLY ARC-WELDED

Every structural steel joint in the new ten-story pediatric ward of the Boston City Hospital will be electrically welded and not a single bolt or rivet will be used in the building frame. Arc welding was adopted because of superior economy, convenience and quietness. Mayor Curley is behind the mask at lower left.

36,240 shares of common stock having no par value, the total consideration thus being $906,000.

Commenting on the request, the decision of the Railroad Commission says:

It is urged that the common stock is not worth more than $25 per share because of the uncertainty of a return thereon for quite a long period of time to come. The principal factor in the uncertainty is the lack of precipitation during the current year. This year, because of the low precipitation, the company's operating expenses, due to the purchase of electricity and the generation of electricity by steam plants, have materially increased. Perhaps the common stock is not worth more than $25 per share. But the record in this proceeding does not establish any such value. Even if it did, we question the propriety of authorizing the issue of the stock on that basis unless the present relative voting status between the holders of the common and the preferred stock is maintained.

▼

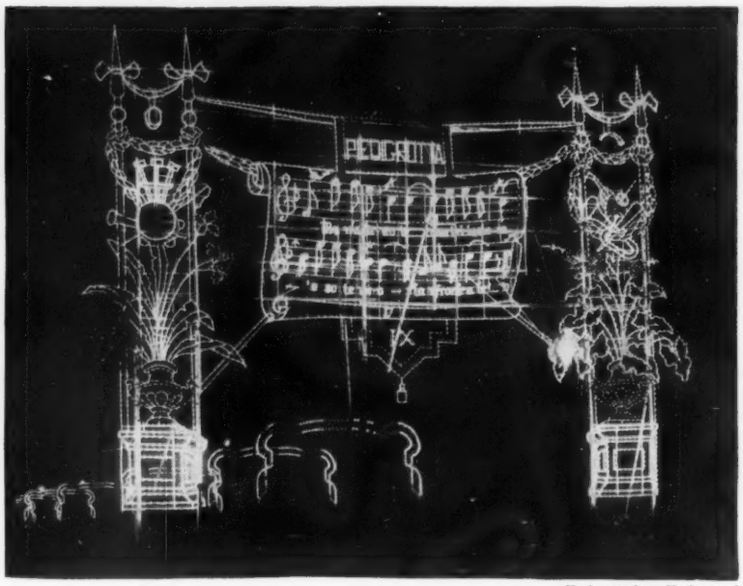
No Relationship Between Produce Prices and Rates

FARMER COMPLAINANTS recently asked the Nebraska State Railway Commission to reduce the rates of the Lincoln (Neb.) Telephone & Telegraph Company at a certain exchange, basing their application entirely on the fact that telephone rates have not been reduced to correspond with the reduction in prices of farm products. The company, on its part, produced testimony purporting to show that the exchange has been operated at a loss for a period extending over six years.

In refusing to grant the reduction the commission said: "Telephone rates were not permitted to soar with the prices of agricultural products during the war, nor can they be now reduced for the reason only that the prices of these products are low. Telephone rates which produce less than a fair return on the fair value of the property would constitute confiscation if ordered by the commission. The method of finding fair value of public utility property to be used for rate-making purposes has been stated by the Supreme Court of the United States, and the use of a lower rate, except on application of the company, would be illegal."

The prices of telephone materials and equipment, the commission found, have gone down somewhat from their peak in 1925 and 1926, and the book figure should fairly reflect a reasonable value of the property in use for public purposes. It adds. "Under the decisions of the courts the commission has no power to make rates based on the value of commodities or property which are in no way connected with the property thus devoted to public use."

SETTING ELECTRICITY TO MUSIC—OR VICE VERSA



—Underwood & Underwood

The traditional festivities at Piedigratta, a suburb of Naples, were again held this year and were marked with old-time color and splendor. This picture shows one of the illuminated arches. It is labeled "O Sole Mio" and shows bars of the world-famous song.

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El Paso Domestic Rates Reduced 15 per Cent

AGREEMENT WAS REACHED on October 26 between the El Paso (Tex.) City Council and officials of the El Paso Electric Company on a rate adjustment which will result in a total annual saving of $177,600, or approximately 15 per cent, to the domestic consumers. The company has agreed to reduce present rates so as to save its customers $85,000 immediately and to make a further reduction of $56,500 when the company's revenues return to the 1930 level. The figure of $177,600 includes $8,500, the cost of a study of the city's electric rates by the Burns & McDonnell Engineering Company, and $27,600, the amount by which the electric company reduced its rates to large commercial consumers on July 1.

The agreement followed a recommendation for a 13 per cent reduction in domestic and commercial rates made to the City Council by the Kansas City engineering firm referred to. This report stated that the city could erect its own electric generating plant for $6,170,000, operate it for $1,532,050 annually, and with an estimated income of $1,787,800 could pay 7 per cent interest on the investment, allow 3½ per cent for depreciation annually and still save $255,750 a year for the consumers of the city.

M. C. Smith, the power company manager, held the Burns & McDonnell recommendations to be unfair because they were, he said, based on only one phase of the company's activities and covered only the naturally most profitable portion of that phase. He said that the only consideration on which the company accepted the reduction was the hope that it would thus increase its business and its desire to "be a good citizen of the community it serves." The Mayor and the City Council agreed that a compromise was better than long-drawn-out litigation.

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Paris, Tenn., Fails to Recapture Light Plant

REFUSAL BY THE United States Supreme Court to review the case of the city of Paris, Tenn., against the Kentucky-Tennessee Light & Power Company brings to a conclusion the long battle of the city to recapture its water and light plant, which it was alleged was taken by fraud and for an inadequate consideration. The unusual nature of the case attracted wide notice. The company announces that it will now make improvements to the plant.

The United States District Court at Memphis ordered the contract canceled and the property returned to the city, but the United States Circuit Court reversed that decision, and the city then appealed to the United States Supreme Court.

Scattered Happenings in the Electrical Sphere

UNITED STATES

Drought Diminishes Hetch Hetchy Output

Lack of water behind O'Shaughnessy Dam on San Francisco's Hetch Hetchy project, as the result of extreme shortage of rain and snow in the High Sierra, caused curtailment of operations at the Moccasin Creek power plant to such an extent that for September the city's revenue from the sale of power to the Pacific Gas & Electric Company was the least it had been since the plant was placed in operation in 1925. This figure was $16,975. In normal years the city's annual gross revenue from the sale of power is in excess of $2,000,000.

To Help Unemployed Engineers

Members of the four major national engineering societies have organized a committee to find employment for professional engineers and to give financial aid to those in actual need of relief. The committee is headed by H. de B. Parsons as chairman and functions through an executive committee, of which John P. H. Perry is chairman; a finance committee and a relief committee. Headquarters are in the Engineering Societies Building at 29 West Thirty-ninth Street, New York.

St. Lawrence Hearings Again Put Off

Public hearings before the Power Authority of the State of New York on the proposed form of contract for the sale of hydro-electric power to be developed in the international section of the St. Lawrence River have been again postponed, Frank P. Walsh, chairman, announces, in order that a reasonable time might elapse for a reply from Secretary Stimson to the memorandum which the Power Authority submitted to him last week.

Rates Slashed in Idaho

Branding rates charged by the Public Utilities Consolidated Corporation (Wallace Division), serving Burke, Mullan and Wallace, as discriminatory and unreasonable, the Idaho Public Utilities Commission has ordered them reduced. All residential rates were brought down to an 8-cent level for the first 30 kw.-hr.; formerly they had been as high as 12 cents.

Famous Damage Case Finally Settled

The United States Supreme Court has refused to review the damage award of $100,000 against the Illinois Power & Light Company in favor of the Cain-Hurley Lumber Company. The lumber company charged that a defective transformer of the power company caused a fire which destroyed its lumber yard and mill at Brooklyn, Ill., in February, 1923, and the case has been appealed from court to court ever since.

Appliance Merchandising in Oregon

Absolute prohibition of the sale of electric appliances by electric utilities is advocated by the Oregon Municipal Ownership League, which is supporting a movement of certain retail firms handling electrical appliances. The next Legislature is to be appealed to, the state regulatory department having refused to find any warrant for interference on its part.

Municipal Ownership in Nebraska

Submission to the Nebraska Legislature of a plan which in essence aims to provide a city manager for all municipalities operating public water and light plants is favored by the Nebraska League of Municipalities. The league holds that with the development of these plants the duties of village boards are becoming enlarged and complicated, the situation calling for more expert knowledge than is usually available for efficient and economical operation. Another resolution recently adopted empowers the league's legislative committee to formulate whatever proposals are necessary to safeguard further the rights of municipalities to continue in proprietary enterprises.

St. Paul Council Repeals Utility Tax

Passage by the St. Paul City Council of an ordinance granting a new 20-year franchise to the Northern States Power Company and its agreement to eliminate the gross earnings tax of 5 per cent now imposed on that company, the Northern States thereupon to reduce rates so as to save consumers about $250,000 a year, leaves only one step—indorsement by the voters—to be taken to bring about this substantial reduction, which will accompany a cut in Minneapolis of $400,000 or $500,000 a year, leaving rates in the Twin Cities substantially even. The referendum will probably be held in the spring. (ELECTRICAL WORLD, October 24, page 723.)

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Coming Meetings

National Electrical Wholesalers' Association—Starrett's Netherland Plaza, Cincinnati, Nov. 9-13. E. Donald Tolles, 165 Broadway, New York.

Wisconsin Utilities Association—Electric Section, Hotel Pfister, Milwaukee, Nov. 12-13. J. N. Cadby, 135 W. Wells St., Milwaukee.

North Central Electric Association—Accounting Section, St. Paul Hotel, St. Paul, Nov. 13 and 14; Commercial Section, Lowry Hotel, St. Paul, Jan. 22 and 23. J. W. Lapham, 803 Plymouth Bldg., Minneapolis.

International Conference on Bituminous Coal—Pittsburgh, Nov. 16-21. T. R. Alexander, Carnegie Institute of Technology, Pittsburgh.

American Society of Mechanical Engineers—New York, Nov. 30-Dec. 4. C. W. Rice, 29 W. 39th St., New York.

American Institute of Electrical Engineers—Winter convention, New York, Jan. 25-29. F. R. Hutchinson, 33 West 39th St., New York.

Evaluating Water Power in Two States

Hearings will be held in Minneapolis on November 16 and 17 to consider the valuation of two water-power projects of the Minnesota Power & Light Company. A valuation of $3,450,000 has been submitted by the company to cover investment in its Mississippi River project and $1,410,000 to cover investment in its Superior National Forest project. Another hearing will be held before the Federal Power Commission in Washington November 30 to consider the valuation of the Alabama Power Company's Coosa River project, licensed in 1921. The company reports an investment of $10,646,000.

CANADA

Farmers Would Nationalize Beauharnois

Robert Gardiner, leader of the United Farmers' party in the Canadian House of Commons, returned to his attack upon the Beauharnois Power Corporation when, addressing a meeting in Calgary, Alberta, he declared that the demands for investigation into political party funds were simply a "red herring." The real issue, he said, is whether or not the most valuable power site in Canada, granted to a private corporation, is to remain in the hands of private interests or whether it is to be turned over to the people of the Dominion. In the meantime, officials of the Beauharnois corporation are remaining silent as to details of the reorganization plans. It is rumored that all of the directors have been asked to resign tentatively and that several of them will not be reappointed.

Middle West Subsidiaries Merge

Consolidation of the Great Lakes Power Company and the Algoma District Power Company has been made effective, and the properties owned by them are now merged in a new Great Lakes Power Company, with total assets of $10,934,578. The merger in no way affects the Great Lakes agreement with the city of Sault Ste. Marie. A hydro plant has been built at Michipicoten with an installed capacity of 23,000 hp. and capable of an ultimate output of 35,000 hp.

ABROAD

I.E.E. Head on British Energy Supply

Delivering his presidential address at the Institution of Electrical Engineers in London recently, J. M. Donaldson showed a lack of enthusiasm for the government electrical undertaking. "The electricity supply industry has been for a long time the plaything of the legislator, and the result has, on the whole, been unfortunate," Mr. Donaldson said. "The time has come when the legislator might usefully leave the electricity supply industry alone to work out its own salvation."

Philip Green Gossler

AS WITH most men of affairs who have achieved great success, Philip G. Gossler's character and personal characteristics cannot be divined directly from memoranda concerning him possible of elicitation from any business organization of which he is in control. Such information as is thence forthcoming is sure to be confined to dates and names and to avoid particulars of even a slightly more intimate description. The development of an autobiographic impulse—so common with authors, artists and holders of public office—would be for most such captains of industry the last resource of a boresome inactivity that never comes.

For activity, at any rate, may surely be ascribed to a man who is not only president and director of so large an organization as the Columbia Gas & Electric Corporation and its various affiliated and subsidiary companies—on its face a full-time job—but is director of twelve other important business corporations, a director of one hospital board, president of the board of managers of a second hospital, and a member—in some instances a director—of 24 social, sporting and sailing clubs in New York City, Long Island, Ohio, North Carolina, Maryland, Florida, Quebec and the Bahamas. Add to this Mr. Gossler's by no means merely nominal connection with the National Electric Light Association, the American Institute of Electrical Engineers, the American Electric Railway Association, the American Gas Association, the Association of Edison Illuminating Companies, the New York Electrical Society, the Edison Pioneers, the Canadian Electrical Association and the Engineering Institute of Canada, and it will be further inferred that, though he does not scorn delights, neither has he any quarrel with laborious days. He has been president of the Canadian Electrical Association and vice-president of both the Edison Pioneers (he was as a young man employed by the Edison General Electric Company) and the New York Electrical Society.

Born in Columbia, Pa., in 1870, Mr. Gossler was educated at Penn State College, receiving the degree of electrical engineer in 1892. He was assistant engineer with the United Electric Light & Power Company, New York, from 1891 to 1895 and then went to Montreal, where he was first superintendent and engineer with the Royal Electric Company for six years and then general superintendent and engineer with the Montreal Light, Heat & Power Company for three more. Returning to the United States, he became vice-president of J. G. White & Company and other companies, serving from 1904 to 1909; was chairman of the board of the Columbia Gas & Electric Company from 1909 to 1922, president and chairman from 1922 to 1926, and was then elected to his present post.

EDITORIALS

L.W.W.MORROW
Editor

Utilities contribute to stability

CONTRIBUTIONS of the electric utilities to a badly shrunken national construction program during these last two years of drab business will be found to exceed one and one-half billion dollars. Literally thousands of men have been kept at work building power houses, transmission lines and distribution and other facilities. Meanwhile these companies have sustained their operating forces at 285,000 people, a figure amounting to 97.2 per cent of the staff in the boom year of 1929, and have paid them $440,000,000, only 1.7 per cent less than the 1929 total.

These definitely stabilizing factors are not all that electricity has done by way of balance-wheel action when almost all else was plunged into the Slough of Despond. Reductions in electric rates since business in general started its disastrous skid have amounted to $60,000,000. This in itself is no inconsiderable sum toward relief of distress and toward release of funds for the support of purchases to keep other industries active in production. And, again, the annual payment of about $203,000,000 in taxes by utilities has done its increased share in keeping governmental treasuries from shrinking too painfully. This amounts to one-third the total payment for service to domestic customers. Regardless of the propriety of using utility revenues so extensively as a medium of collecting taxes, there should nevertheless be governmental comfort in the assurance of such an amount of tax revenue.

These figures were cited by Paul S. Clapp, managing director of the National Electric Light Association, in an address to the National Association of Railroad and Utilities Commissioners. He attributed the capacity of the electric utility industry to make such significant contributions to economic stability primarily to the stabilizing influence of regulation upon the industry. Regulation may have its weak points when weighed in academic scales, but as practical, common-sense economics it has demonstrated its worth in stabilizing securities, in stabilizing employment, in stabilizing purchasing power and in stabilizing governmental revenues through the medium of an industry stabilized within itself.

St. Lawrence development still negotiated

THE latest development concerning the St. Lawrence project has been a conference between Chairman Walsh of the New York Power Authority and Secretary of State Stimson. Letters to the President have been superseded by personal conferences. Chairman Walsh desires federal admission that New York owns the water and the riverbed and will be charged only with the cost of the power project. He concedes to the national government jurisdiction over navigation and commerce only and insists that definite engineering plans and agreement upon New York State rights should precede negotiations with Canada.

So far as can be learned, Secretary Stimson granted no claims, though he expressed his wish to co-operate with the Power Authority and to protect the interests of New York State in any

treaty negotiations. There is little hurry at Ottawa or Washington to bring negotiations to a conclusion, despite the insistence of Chairman Walsh that a date should be set for beginning construction on the river. Nor is it readily seen how work could be started until all the international and national legal and political aspects of the project are settled. Investors will not be favorably inclined toward security issues unless the investment values are cleared of possible political and legal jeopardies. It is very evident that work on the St. Lawrence will be done at Ottawa, Washington and Albany instead of at Messina for the next year at least.

Empirical approach to transmission

ECONOMIC and service values in transmission must still be measured in terms of empirical formulas, theory and experience. Just now lightning-proof lines and the value of wood insulation are active subjects for engineering opinion. The basis of indecision rests upon meager field data, differences in opinion about fundamental theory and inconclusive cost comparisons.

Until the engineers concerned get together around a table to fix upon a common laboratory procedure unbiased by sales or personal prestige it is doubtful that executives will or should authorize transmission-line expenditures much in excess of present installed costs. The industry has been busy collecting data and opinion, and the time appears ripe for a clearing-house attempt to reach conclusions.

Swope thinking versus La Follette thinking

LAST week Gerard Swope and Senator La Follette had a friendly argument about the merits of their respective plans for industrial stabilization. Briefly, Senator La Follette advocated a national economic council while Mr. Swope urged the use of the trade association as the key agency.

Very frankly Mr. Swope pointed out the practical weakness of the economic council plan. Such a group might state principles but it could not apply or enforce them. What is needed is a directly responsive and competent business agency in each industry group, because stabilization is not only a matter of theory or principle—it requires direct and competent business action by business men. Mr. Swope said that he had faith in voluntary co-operation of business men in carrying out principles, but if that failed coercion should be used.

The advice of Mr. Swope is sound. It is based on business experience. It implies trial of a logical business mechanism on a voluntary and co-operative basis through already existing agencies. By contrast the plan of Senator La Follette is idealistic but impracticable. But why not try both? Institute the national economic council, preferably by putting on it executives of trade associations, but at the same time try out the Swope plan through one or more of these trade associations. What is wanted is business stabilization, and this can be had only by trying out good suggestions to see if any or all of them will be effective.

Quality in domestic appliances

IN LARGE measure competition and individual initiative of manufacturers have produced satisfactory appliances and wiring supplies for the domestic market. But a recent movement sponsored by the utilities has undertaken to place some degree of industry measurement and control upon this equipment. As pointed out by Charles L. Edgar, "domestic customers are rarely in a position to choose the type of equipment best fitted for their requirements, and unfortunately some manufacturers and retailers think more of their initial profit than of the ultimate satisfaction of the purchaser; consequently it devolves upon the service companies to act in a protective and advisory capacity for the mutual benefit of the combined interests."

Whether all agree with this statement or not, the fact remains that, through the Electrical Testing Laboratories, the utilities have started upon a program to carry out this purpose and have already done work upon plugs, cords, irons, ranges, heaters, heating pads and other electrical devices. Very elaborate tests have been made and recom-

mendations for improved products have been submitted to manufacturers, who in general have accepted and applied these ideas for improvement. Thus the lamp is being followed by other appliances in a studied effort to bring about improvement.

Yardsticks for good and bad products are difficult to determine, nor is it agreed that either a minimum or a median standard can or should be used. The entire movement is yet to be perfected and evaluated, but all can co-operate in trying to make practical and useful the intent of the program. It should be treated in a constructive manner, for already enough has been done to show that great possibilities exist for industry good and for public good. Full co-operation and the right attitude will iron out difficulties and determine details.

Changed rate of utility growth

MANY students of the industry believe that it has reached and passed what one might call the peak in the rate of growth of loads and that from now on the utilities will be stabilized on a less rapid rate of increase. This belief is based upon the following facts:

1. A large part of the growth in the past twenty years was due to the electrification of old steam-driven plants and to the connection of industrial plants which had employed electric power plants of their own. The utilities have not only gone about as far as they can in this direction but are now faced with the possibility of a reversal of trend.

2. During the past twenty years, and particularly during the past ten years, electrical men have been busily engaged in spurring the use of electricity for both light and power purposes over virtually all the populated area of the country. The interconnections which have been made as well as the small plants that have been built have now resulted in covering almost all the available territory, so that growth of the type that resulted from such activities is now nearly eliminated with respect to the future.

3. The industry has been quite successful in reducing the cost of power to consumers. This reduction has been partly due to technical advances and partly due to greatly improved load factors obtained through the use of diversities within a given community and diversities between communities. Further technical advances are to be expected, but unless they result in greatly decreased investment they cannot be expected to have much effect upon the price to the consumer. Further increase in diversities is also to be expected, but this change will not continue to occur at any such rate as has characterized it in the recent past. It would seem, therefore, that load which can be obtained only through further reduction of selling price may not be connected so rapidly in the future as it has in the recent past.

There is no reason to construe these things as indicating that any one is pessimistic with respect to the future of the industry. This is not the case. New uses for electricity in industry are going to be found, and a great increase in the use of electricity by the residential rural and small commercial customer is going to come. Great technical advances are also certain. None the less, although an annual rate of growth of the general order of 15 to 20 per cent may be taken as characteristic of the past ten to fifteen years, from now on it is more reasonable to assume a rate of growth of between 5 and 10 per cent.

A new industry plan for unemployment relief

UNEMPLOYMENT is a responsibility of industry very largely, and industry should take leadership in practical plans for relief. In line with this premise a very interesting plan has been announced by A. Edward Newton, chairman of the board of the I-T-E Circuit Breaker Company. For the next five months it is proposed to donate two per cent of gross sales to local relief in the communities in which the sales originate. The hope is expressed by Mr. Newton that other manufacturers may be led to adopt this plan or some modification of it as a practical means for industrial organizations to contribute nationally to unemployment relief.

This interesting and unusual plan deserves study by industry. Apparently, if properly carried out, it will afford a most practicable and effective means for spreading over industry the money needed for the nation's unemployed. Its widespread adoption might prove of the greatest benefit.

Commissioners Militant in Defense of State Rights

Federal power grows at expense of state authority.

State governments weak, financially and intellectually.

Too little spent in support of utility regulation.

Demagogues cost public more than outright thieves.

Government ownership the real objective of the radicals

PRESERVATION of the rights of the states against the complete absorption of those rights by federal laws, federal courts and federal bureaus was the ruling theme at the recent meeting (October 20 to 23, 1931) in Richmond, Va., of the National Association of Railroad and Utilities Commissioners. The occasion was unusually opportune for a vigorous arraignment of the ominous trend toward centralization of government authority at Washington. The commissioners had attended the Yorktown sesquicentennial celebration of the surrender of Cornwallis. The addresses there and later at the banquet tendered to the commissioners by the Richmond Chamber of Commerce and the State Corporation of Virginia portrayed anew the struggle for freedom from oppression and reasserted the wisdom of the patriots who framed a constitutional federation of states intent on retaining sovereignty over their respective affairs.

Also Virginia, and the South generally, has been the source of much of this wise political philosophy. But a still more justifiable basis for pressing the issue is the rapid accumulation of threats to state sovereignty in the realm of regulation as exemplified by the duties of the utility commissions. Examples of the militant attitude of these commissioners is found in the addresses of Frank P. Morgan, member of the Alabama commission, and James S. Benn, former member of the Pennsylvania commission, excerpts from which follow.

Mr. Morgan devoted his remarks to an elaboration of the thoughts which follow:

"If I were asked to select the most appropriate state in the Union in which to review the long struggle which began between Thomas Jefferson and Alexander Hamilton, a contest which has played such a leading rôle in our national history, I would select Virginia, but if the choice turned upon the question of a sympathetic local audience, an audience keenly alive to the principles and privileges of local self-government and intent upon protesting against any further encroachment by the federal government upon the rights of the states in fields where the states can adequately function, whether they are so functioning or not, then I would turn, if you please, to old Massachusetts and her New England sisters, and next to Wisconsin and the great Northwest.

"We need regional federal power commissions just about as much as Switzerland needs a navy. A great many Southerners, formerly the custodians of the doctrine of states' rights, are apparently unable to discern the great distinction between federal aid in education, road building and health and federal usurpation in rate making. When the necessity arises for regulation of power in interstate commerce the first step should be a trial of such regulation by the states under the compact clause of the federal constitution. If the millions of utility customers in this country could talk to the thousands of shippers and receivers of freight, who have had experience with federal regulation, this attempt to make federal regulation of the public utilities an issue in the Presidential campaign of 1932 would die over night.

"By this statement I do not mean to draw a sweeping indictment against federal regulation of the railroads. From the beginning the overwhelming preponderance of interstate commerce by the railroads created an imperative necessity for considerable regulation of them by the federal government. The reverse is true in regulation of public utilities as distinguished from railroads.

Federal regulation grasps to grow

"As surely as authority is given by congress to the Federal Power Commission to regulate interstate power, just as surely there will ultimately be written into the law the same sort of sections now in the federal transportation act of 1920, which have, to a great extent, removed the control of intrastate commerce by the railroads from jurisdiction of the state commissions. There is a fundamental difference between regulation of railroads and regulation of public utilities, especially the power utilities. I hold that a federal commission should never be allowed to dictate the rates charged within the borders of a state for a commodity generated out of the natural resources of that state.

"Congressmen are quite responsive to public opinion when it is clearly expressed, and if the people of the

states want a fair trial given to state regulation of public utilities before it is sentenced to death, without a trial, by federal regulation they will have their wish. The earning of a living takes most of the average voter's time, but if he will devote one-tenth of the time he spends on amusements to a study of government this tendency to centralize power in the hands of a few men remote from him, men he will never have an opportunity to know and judge, would be sharply checked.

"What the people do not know, and what our critics are careful to leave untold, is that in only a few states has real regulation been given a fair trial.

"The American bar probably deserves Chief Justice Hughes' definition, 'A round-up of intelligent discontent,' but until these critics of state commission regulation lend a hand in an effort to make state regulation workable they cannot be placed in that category. 'Rabble rousers' is a more fitting description for these gentry

We need regional federal power commissions just about as much as Switzerland needs a navy.

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If the millions of utility customers in this country could talk to the thousands of shippers and receivers of freight, who have had experience with federal regulation, this attempt to make federal regulation of the public utilities an issue in the Presidential campaign of 1932 would die over night.

State governments weak

"The greatest danger to the remaining rights of the states is not to be found, primarily at least, in the halls of Congress. The weakness of the state governments and their consequent failure to live up to the noble responsibilities provided for them by the founders of the Republic constitute a constant menace to the rights of the American people to local self-government. The greatest weakness of the state governments, as in the national government, is manifestly to be found in the legislative branch. Unless a man is imbued with profound faith in the final results of this experiment in democracy, known as the United States of America, he had best not watch the machinations of the average state legislature too closely, lest he become cynical and grow sick at heart.

"Every right carries a responsibility with it, and unless the voters of the states elect men to their state legislatures who take their responsibilities seriously, men jealous of the rights of their states, but conscious of the fact that those rights will perish unless exercised, the most zealous states' rights advocate will be shamed into silence when the long, strong arm of the federal government reaches out to grasp the scepter of power from the weak hands of once proud states, sunk to the level of petty provinces.

"This body of men assembled here today is being severely criticised throughout the country, when most of the criticism would be more just if it were leveled at the state legislatures which have created us and created the laws and appropriations under which we are expected to regulate the public utilities of this country in the public interest.

"Every power possessed by the federal government has been delegated to it by the states and every right of local governments was handed down to them by the states. Yet here stand the states, the original sovereigns, poverty stricken and begging for alms like an old father who has given all his property to his ungrateful children—these King Lears are about to be driven from the doors of the home they labored to build! While not affording the opportunity for publicity which has almost become a national disease, there is a greater field for leadership in the state governments than in any other public service.

The earning of a living takes most of the average voter's time, but if he would devote one-tenth of the time he spends on amusements to a study of government this tendency to centralize power in the hands of a few men remote from him, men he will never have an opportunity to know and judge, would be sharply checked.

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Until the voters of the states come to realize that the most important official they are privileged to elect is their representative in the state legislature we cannot expect any higher personnel in this department of government.

Regulation has not had adequate trial

"Lord Macaulay said that 'No one can say that Christianity is a failure, it has never been tried out.' His famous remark applies with equal force as a reply to those critics who cry out that state regulation of the public utilities is a failure. Every person who is at all informed upon this subject knows that there is not adequate regulation of the public utilities in more than one-fourth of the states of this Union. Eight states make no pretense at regulation of public utilities and many others make only a pretense. Twenty-four state commissions have no control over the issuance of securities of the public utilities they are supposed to regulate; real regulation requires such jurisdiction and also jurisdiction over the issuance of certificates of convenience and necessity for the construction of transmission lines, not only before construction begins but during and after construction. Twelve states pay their commissioners salaries of less than $4,000 per year, and out of 33 states where information was obtained concerning their appropriations twenty states had appropriations of less than $75,000 per annum.

"The people of the most sparsely settled state in the Union cannot expect adequate regulation of the public utilities unless their public service commission is furnished with an annual appropriation of not less than $75,000. Any state which expects able, honest and experienced men to continue to serve as its public service commissioners on salaries less than those paid federal bureau clerks is merely wasting the meager salaries it does pay. Any state which pays out more than 25 per cent of the sum set aside for regulation in salaries to the commissioners themselves should abolish the commission or increase its appropriation; many states pay out more than 50 per cent. Expecting a public service commission adequately to

regulate the public utilities without an able staff of engineers and accountants is like going hunting without a gun.

"Every man who knows a hawk from a hand-saw in the political world knows there is a lot of tom-tom beating and ballyhoo about this so-called power issue. Inadequate as state commission regulation of the public utilities has been in many states, it has done more to establish adequate service at reasonable rates than will ever be accomplished by our critics. Governors, United States Senators and even local politicians have joined in the hue and cry.

"Intellectual dishonesty of political leaders has cost the people far greater sums than have every been stolen from their public treasuries by cruder thieves. Calm-blooded, clear-eyed men who go quietly but steadily about their professions of engineering and accounting, under the supervision of their public service commissions and far removed from political forums, can and will correct the injustices and inequalities existing in public utility rates. The politicians will only make an expensive mess of it, as they have already done with every economic issue they have so voluntarily offered to settle.

"No body of public officials on earth is offered so much free advice and furnished as little evidence. No public service commission should be at a loss in employing rate experts; the woods are full of them. Every drugstore cowboy, every hotel lobby loafer and every Pullman smoking room lecturer can tell you offhand just how to make rates. College professors and economists who never operated or regulated a public utility one single day of their precious lives can and do write volumes on the subject.

"To me it is nothing short of amazing that a man with sense enough to insist upon an able physician when he is sick, licenses pharmacists to fill prescriptions written by the physician, competent lawyers to make his will and draw his deeds and who even demands references when employing a cook will walk into the office of an experienced public service commissioner and begin telling him and his staff of professionals how to make rates.

Every person who is at all informed upon this subject knows that there is not adequate regulation of the public utilities in more than one-fourth of the states of this Union. Eight states make no pretense at regulation of public utilities and many others make only a pretense.

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Intellectual dishonesty of political leaders has cost the people far greater sums than have ever been stolen from their public treasuries by cruder thieves.

Valuation only one factor in regulation

"Since the late Senator Robert M. LaFollette succeeded in convincing Congress in 1913 that the properties of the railroads of this country should be valued for the purposes of rate making, nearly two hundred million dollars have been spent by the federal government and the railroads in valuation, not including litigation over valuation, and no one can point out a freight rate in the United States based upon this valuation. Back of these politicians who have become adept in peddling the usual patter about valuation of public utilities, clinging to their coat-tails in fact, is an army of shysters interested in the fat pickings to be had if federal regulation of the public utilities can be put across as a necessary prelude to a repetition of LaFollette's valuation folly of 1913.

"Apparently the value of the property of a public utility must be found and fixed before proceeding to the establishment of reasonable rates. Actually there are many instances of a public utility accepting rather low rates—if designed to encourage increased sales—where the rate order is without a formal finding of value. By low rates I mean rates based upon tentative valuations which discard reproduction costs as the controlling element. Other public utilities, similarly situated, fight similar rate schedules in all the courts of the land, if the rate orders are accompanied by formal orders of valuation which discard reproduction cost as a controlling element, or at least fail to give it the consideration which the utility owners think it deserves. It never seems to occur to the valuation theorists that public utilities may have other interests than rates in formal orders of valuation. Anything which affects the sale price or value as collateral in borrowing money is a matter of grave concern to any property owner.

"The consuming public is interested only in adequate service at reasonable rates and the commission which is interested in providing these things for the present generation of consumers is not as seriously concerned with the several theories of valuation, or indeed with the decisions of the courts on the question, as are most of the non-commissioned regulators.

"Scientific rate making solves more public utility problems and solves them more quickly and inexpensively than litigation, political oratory and academic discussions. I hazard the opinion that there are many more instances of inequalities and unjust discriminations as between the classes of the customers of the average public utility than there are of excessive rates of return paid by the customers as a whole to the utility.

Power not a justifiable campaign issue

"If the American people are still possessed of that sturdy common sense which has so far distinguished them they will not allow the price of a commodity which constitutes less than 3 per cent of the average family budget to be made a national political issue in 1932. This is not to say by any means that inequalities, unjust discriminations and unreasonable rates for electricity do not exist nor to say that even in the few states having adequate laws and appropriations for public utility regulation that regulation is perfect.

"The duty of awakening the people of this country and of enlightening them upon this question rests first upon the members of this association. Before we adjourn plans should be made for a nation-wide campaign and, if necessary, funds should be raised to employ informed men to speak on the subject. A call should be made for volunteers among the members to go, only upon the invitation of the state commission, to states where legislation is needed. A fleet is no faster than its slowest ship and a chain no stronger than its weakest link. Those states where there is either no regulation or only a semblance of it are a menace to the rights of all the states.

"In the long run the best federalist is a states' rights advocate because a nation as vast and varied in its sectional needs as ours will perish under an all-powerful centralized government. Even within the borders of the states there exist differences which must be recognized by state authorities. Is not the world still reeling under blows dealt it in the death agonies of the most powerful centralized empire of modern history? Is not the path of the ages strewn with wrecks of governments which became too powerful to be tolerated by the governed? Do not centralized banking, centralized industry and centralized business of all kinds collectively constitute the greatest single cause of our present plight? Are not France and Belgium, two nations notable for individualism, the most prosperous countries today in the world? 'Local self-government is the life-blood of a republic.'"

Government ownership the hidden objective

Former Commissioner Benn of Pennsylvania also took up the cudgel for the rights of the states, pointing out that state regulatory commissions had done their share in making effective those regulatory functions which were inherently in the federal province.

"In one guise or another, we have in recent years witnessed many of these Congressional efforts to invade the proper fields of state utility regulation. Not alone the interstate transmission of electricity, gas, oil and telephone communications have attracted the legislative impulses of the solons at Washington; practically no field of utility regulation has escaped their acquisitive interest. Whatever may be the merits or demerits of individual propositions, the fact remains that the propulsive and motivating force back of much of this legislative urge in Congress is aimed at diminishing the functions, and pushing aside the inherent rights, of the states.

"The ratepayers and the public generally have had and always will have more considerate and more efficient service from state regulatory bodies than they could possibly have from absentee agencies sitting in the city of Washington. Further, I take it that the states themselves are better able to meet the requirements of their people, in the matter of utility service, rates and regulation, than would be possible under any Congressional attempts to apply utility regulation horizontally over all of the states of the Union.

"What this association and the state commissions have properly fought against has been the attempted interjection of federal authority into domains in which there is no necessity for the exercise of federal authority, or into domains in which the rights and interests of the states, and of the ratepayers and utilities of the states, are paramount.

"Government ownership is the real objective of many of the most voluble critics of existing regulatory laws and of many of the proponents of increased federal jurisdiction. This association has repeatedly declared its opposition to government ownership, and, as an individual, having made some study of the results of government ownership and operation of public services and utilities in this country and in Europe, I am in opposition to the theory of launching the government of the United States, or of the states themselves, into the ownership and operation of utility business. At the same time, we can have respect for the open and avowed advocate of the government ownership theory, even if we think the advocate is mistaken. Sincerity is always entitled to respect, no matter how wide apart individual views may be. Therefore, consistent advocates of government ownership, either in or out of Congress or other official position, have the same right to advance their opinions as we have to stand firmly in support of ours.

"It is the demagogue who is too crafty, or who lacks the moral or political courage, openly to expose his government ownership objective, and who seeks to attain it under cover of destructive sapping and mining of the rights of private property, of the regulatory powers of the states, and of the administrative functions of the state commissions, who is the most dangerous factor in this situation. Usually this type is developed among political adventurers and seekers for personal advancement, who are most persistent and blatant in their assaults. To them, the law of the land, as established in the Constitutions of the nation and of the states, and as written in legislative statute and the precepts of the courts, is accorded neither respect nor allegiance.

"You all know this type. It is prevalent throughout the Union, from Maine to California, from Canada to the Gulf. It thrusts itself into Congress, it froths and fumes at the present time from a number of gubernatorial chairs, and is found in legislatures and quite every other forum in which loud noises can be produced to attract public attention to self-seeking patriots.

Divorce politics from regulation

"Problems of utility regulation are in the main economic. Politics should be as far removed from regulation and commissions as from the law and the courts. The very heart of regulation is to deal with fairness alike to ratepayers and utilities. Their interests are fundamentally and inseparably the same. Their interests, and the general public interest of which they jointly form a part, can never be served when politicians are permitted to make a football of regulation, or to advance themselves by advocating the destruction of the fundamentals upon which regulation rests. Recent decisions of the Supreme Court have reflected the principles for which this association has contended.

"I urge the association, and the state commissions, stoutly to maintain their positions in defense of the real public interest against the assaults of the opportunists, the theorists and the destructionists, who unceasingly organize these assaults. And I venture to predict that in this stout resistance the association and the commissions will have the support of the American people."

Scientific rate making solves more public utility problems and solves them more quickly and inexpensively than litigation, political oratory and academic discussions.

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If the American people are still possessed of that sturdy common sense which has so far distinguished them they will not allow the price of a commodity which constitutes less than 3 per cent of the average family budget to be made a national political issue in 1932.

Electricity Simplifies Operation of Railroad Bridge

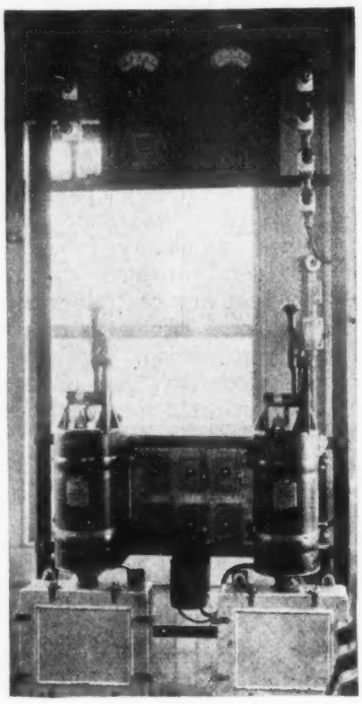
By R. A. CHURCH
Cutler-Hammer, Inc., Milwaukee, Wis.

Elimination of a steam boiler plant, with its attendant labor, and elimination also of cumbersome mechanical adjuncts to the traffic signal system were accomplished when the operation and control of the New York, New Haven & Hartford Railroad bridge across the Norwalk River at South Norwalk, Conn., was changed from steam to electricity. Steam operation required the services of three watch firemen in addition to the bridge operator. With the steam equipment it was impossible to tie in the bridge operation with the traffic control system except mechanically, requiring continuous and close inspection of interlocking parts to assure their necessary perfect operation. With the electric equipment, however, only the bridge operator is needed and the proper functioning of the interlocking between the traffic control system and the bridge movement is checked automatically by its performance.

This bridge is on the main line of the railroad and is of the swing type, pivoted in the center and with all control equipment on shore. Power for the operation of the bridge is taken from the railroad electric traction current supply, which is in duplicate, thus insuring an uninterrupted power supply.

There are two motor drives. One is for the actual turning of the bridge and the other is for driving the wedges which lock the bridge in the closed position and act as supports to carry the weight of the bridge ends to the shore piers. There are two wedge drives, each of 15 hp. The swing drive of 30 hp. is in duplicate, so that if the first motor fails the control can be readily shifted to the second and the bridge continue to operate.

The electrical installation has definite safety features which prevent power admission to bridge motors before traffic signals are set to allow bridge opening, which prevent locking wedges from over-travel in either direction by the use of limit switches, prevent operation of the bridge-turning motor until the wedges are fully withdrawn, do not allow wedges to be inserted until the bridge is in the proper

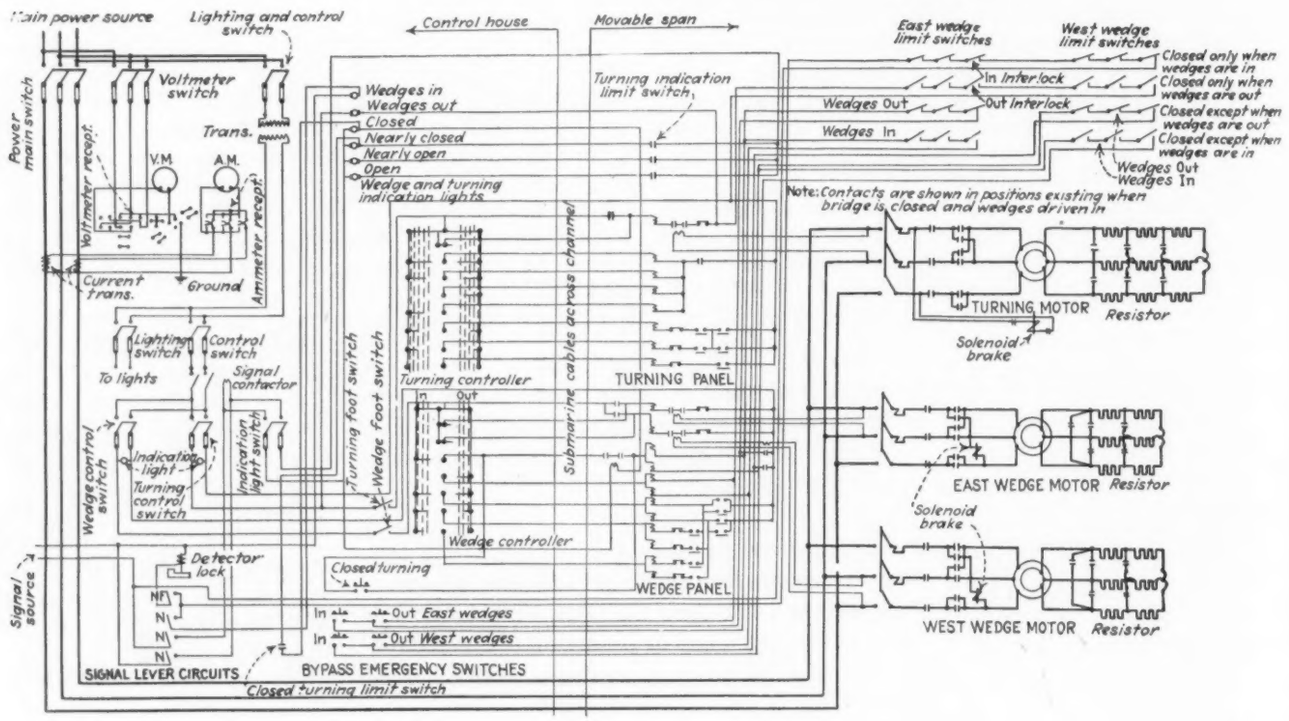


Remote motor control simplifies bridge operation

These two drum controllers and fixed push - button control the turning and the locking of the main line railroad bridge of the New York, New Haven & Hartford Railroad at South Norwalk, Conn. The indicating lamps at the top show the in and out positions of the locking wedges and the position of the bridge in its swing.

Railroad bridge electrical control scheme

Features of interlocking between the bridge operation and the traffic signal system. For instance, it is impossible to furnish current to the bridge motors unless traffic signals are set for bridge opening.



closed position, hold off the clearing of track traffic signals until wedges are fully driven and rails are properly aligned and furnish indicating light signals to the operator showing the positions of the wedges and of the bridge as closed, nearly closed, open and nearly open. Since the operator's cabin is on shore and the control and power conductors are carried in submarine cable to motors on the pivot pier, it is impossible to put in fuses as overload protection on the motor contactor panels. There is no one on the bridge when it is open and a blown fuse on a motor panel would be a serious matter. Overload protection at the motors is afforded by the use of circuit breakers with automatic resets so that the motor circuits are restored when the controllers on shore are returned to the center position.

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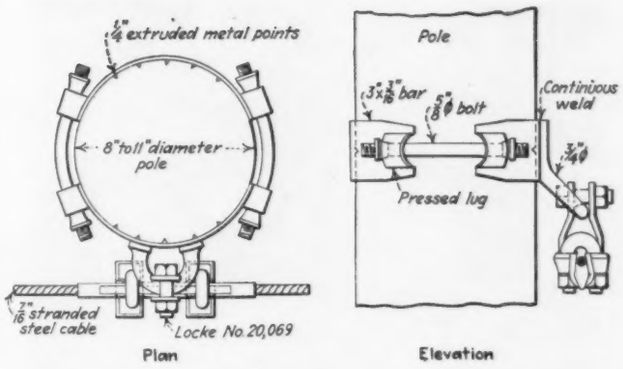
Ground Wire Attachment for Wood-Pole Line

By H. V. INGERSOLL

Stone & Webster Engineering Corporation, Boston

To avoid undue metallic penetration into the heart of the wood and gain increased flexibility in supporting the ground wire on an H-frame, 110-kv. pole line between Petersburg, Va., and Roanoke Rapids, N. C., the Stone & Webster Engineering Corporation designed a new type of pole band and trunnion clamp in the construction of this 56-mile circuit. The power conductors are of No. 0000 stranded copper and two $\frac{7}{16}$-in. Siemens-Martin stranded steel cables connected to earth at each pole structure are used as ground wires.

Previous experience with various types of ground wire attachments showed that metallic penetration into the heart of the wood was undesirable as it provided a path for direct lightning strokes into the wood, which caused shattering. A pole band was, therefore, developed which clamps around the pole with no metallic penetration deeper than $\frac{1}{4}$ in. into the wood. The cable clamp is attached to a U-bolt welded to this band, which provides a flexible connection without sacrificing strength.



Detail of suspension type ground wire attachment

The details of this design are shown in the accompanying illustration. A trunnion type clamp was used because of its combined flexibility and high slip strength. In order to allow for some side swing caused by lateral wind force on the wire, the U-bolt is welded to the band at an angle of 45 deg., which allows approximately 1-in. clearance between the pole and the clamp in its normal position. In order to minimize the possible slippage of the band around the pole the metal was punched to give several extruded tips approximately $\frac{1}{4}$ in. long, which proved to be very satisfactory in keeping the band in position. Tests on the band indicated that it withstood an unbalanced force of approximately 7,000 lb. before it started to slip around the pole. The slip strength of the clamp is approximately 5,000 lb.

As the poles on this line were purchased to minimum top and butt measurements only, the bands were designed for a variation of 3 in. in pole diameter. The construction force found this band considerably simpler to erect than previous attachments used for this purpose.

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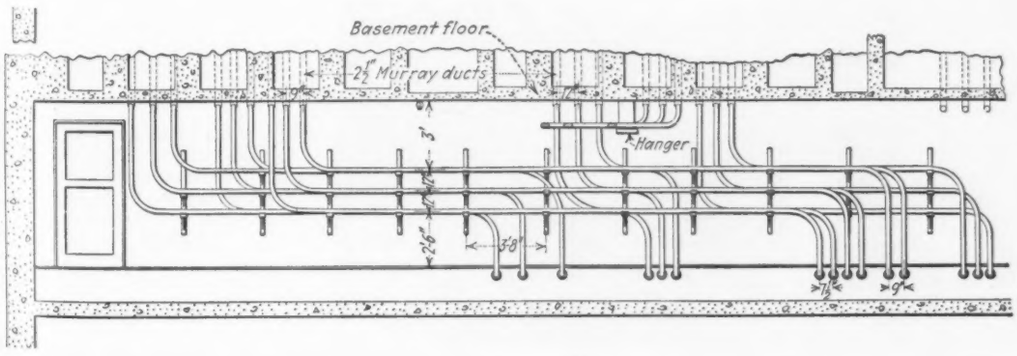
Heavy Protection of Cables Avoided

When cable runs are banked along the walls of substation basements in which equipment is located and men normally work it is usually considered necessary to do more than just fireproof them with asbestos tape and cement as a protection for themselves against the failure of one of their number. In some installations the whole bank or each cable may be incased in a concrete envelope. This necessity has been avoided in the later substations of the Commonwealth Edison Company, Chicago, by constructing cable tunnels below the basement floor and parallel to the isolated phase bus structures above. In these tunnels the cables may safely be laid on racks, where they are much more accessible for change than if they were banked along the basement wall.



Underground Net

By WILLIAM JORDAN, 3d
Distribution Engineering Department,
Atlantic City Electric Company, Atlantic City, N. J.

A transformer vault location 200 ft. from the ocean

Well-points and electrically driven pumps draining the subsurface water before excavation was started. Men in the background are using pneumatic drills to cut the street paving for the duct trench.

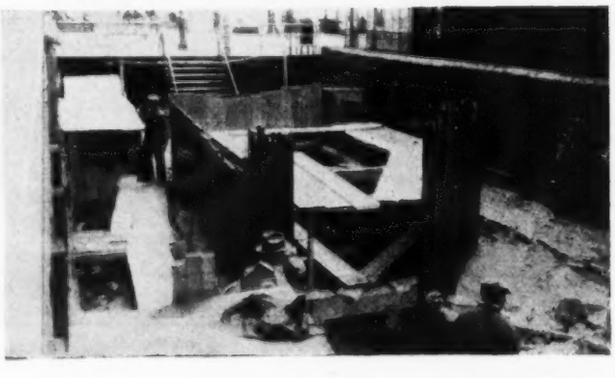
PART of an extensive program in which the overhead distribution system throughout the main business section of Atlantic City will be placed underground and converted to a 120/208-volt network has just been completed by the Atlantic City Electric Company. Since work was started, early this spring, the central area, comprising twelve city squares, or approximately one-third of the whole project, has been finished. Due to crowded traffic conditions during the summer months operations were suspended until fall, but it is planned to pull cables in the ducts which have been laid as soon as conditions permit.

As Atlantic City is located on a shallow sand island, water is only a few feet below the surface of the streets and the engineers have been confronted with most unusual constructional problems. Before a street was opened well-points had to be sunk along the curb and connected to vacuum pumps four or five days in advance. The water level was thus lowered 15 to 20 ft. in the area to be excavated. These well-points consisted of 3-in. iron pipe, 30 ft. long, perforated and wrapped with fine copper mesh 10 ft. from the point. Smaller sizes of 1½-in. pipe 14 to 20 ft. long, with a 3-ft. screen, were used between the large ones. Spacing was determined by the depth of excavation necessary in a particular area and the subsurface water level was found by test holes dug with an auger. As work progressed toward the beach, where seepage was more rapid, the spacing had to be reduced, more well-points used and several pumps operated in parallel. With the exception of areas in which the water table had been previously lowered to a sufficient depth, transformer vault and manhole excavations were completely surrounded by well-points, two large ones at diagonal corners, with intermediate small ones spaced 2 or 3 ft. apart.

Manholes and ducts were placed under the sidewalks in order to avoid as much surface water as possible. Excepting the shallow trenches for transite service duct, sheet piling was always necessary; 3-in. yellow pine sheeting, supported by 8x8-in. whalers, was used in manhole and transformer vault excavations, which were generally 10 to 12 ft. deep. In several cases it was necessary to go to a depth of 17 ft. in order to avoid obstructions. Here interlocked steel sheeting was required. In the duct trenches, which ran at an average depth of 5 ft., 2-in. wood sheeting with 4x6-in. whalers was used.

Piling cannot be driven more than a few inches directly into solid level sand, so when an excavation had progressed to a depth of 2 or 3 ft. two layers of whalers were set up in the form of a crate and the sheeting stood against it. As sand was dug from the inside, each sheet pile was driven in progressive steps. Below a depth of 6 ft. additional whalers were built in under the "crate."

As far as possible the order of procedure followed

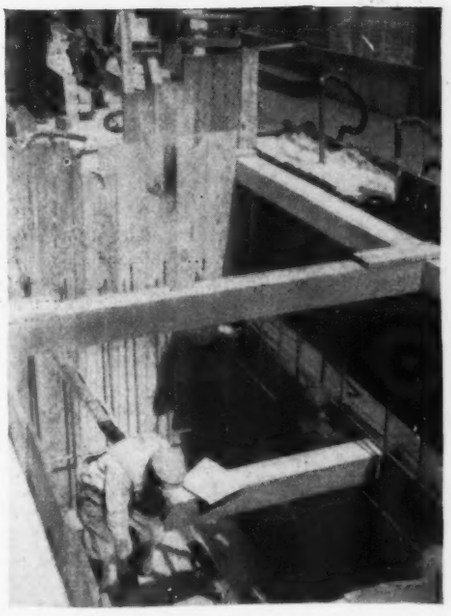


Digging sand below sea level

The same location as the picture above, showing the manner in which steel sheet piling was driven as sand was dug from the inside.

t work at Atlantic City

Integral waterproofing was used in all concrete for vaults and manholes. Roof slabs, in general, were above the subsurface water table, but walls and floors had to be designed to withstand the pressure of fluid sand. As the forms could not be stripped for a week or more, it was often necessary to dead-end duct banks short of the



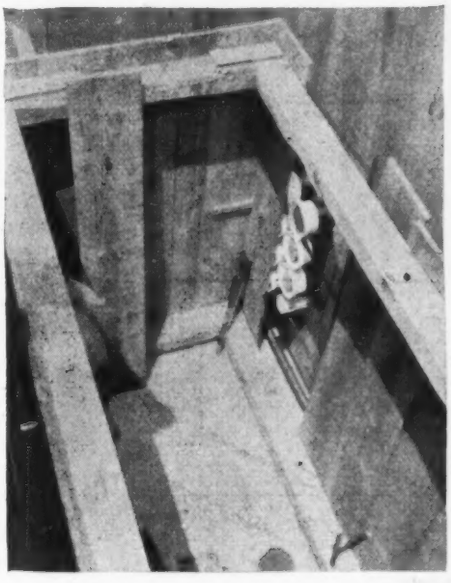
Erecting steel reinforcing for a concrete vault below the sidewalk

Two of the smaller type well-points, 20 ft. long, are visible behind the steel sheeting.

Forms for a rectangular type manhole

Porcelain bells fitted with fiber couplings were cast in the wall in order to make a watertight duct bank entrance.

The tier-by-tier method of laying fiber duct in concrete



Fiber couplings in the wall of a manhole

The ends of the fiber ducts were dipped in asphaltum paint and fitted into these couplings, making a watertight connection.

was to time and size the various crews so that the men setting well-points started from a vault location and remained four or five days ahead of the men breaking pavements. The latter were closely followed by digging crews, working in conjunction with carpenters, to build forms and set whalers for sheet piling. Duct layers followed next, along with concrete gangs, and within a day or two another gang appeared to fill in the trenches, pull sheet piling and prepare for a second group of concrete men to lay paving.

manholes. In order to secure watertight joints porcelain bells with fiber couplings were cast in the manhole walls and when the connections were made the ducts were fitted into the couplings on the outside.

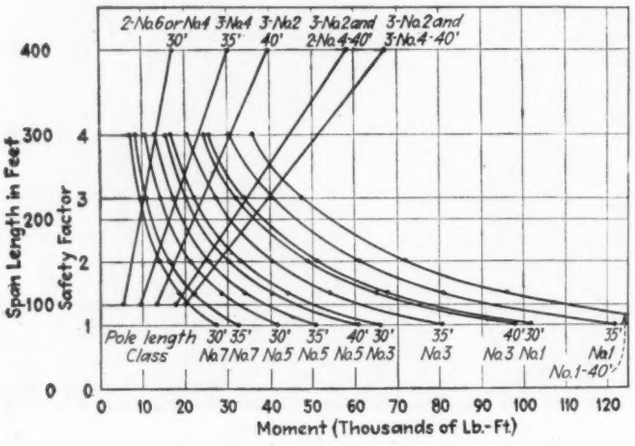
Although this entire system will be virtually submerged, the vaults and manholes which were installed several months ago have remained dry in spite of abnormally wet weather, and indications are that water seepage will cause no more concern than it has in systems much more favorably located.

Quick Determination of Transmission Line Safety Factors

By B. E. ELLSWORTH

Engineer Iowa-Nebraska Light & Power Company

It is often desirable to determine the safety factor of a proposed transmission line on short notice. The ordinary mathematical solution is slow and a separate solution is required for each type of construction, kind and size of pole used, span length, etc. The curves shown here illustrate an accurate and quick method of determining this safety factor without resorting to any calculations.



Line safety factors at a glance

Assume a 33-kv. line using three No. 2 bare copper conductors with a lower 6,600-volt circuit employing three No. 4 bare copper conductors. This is a typical transmission line with a farm line circuit underneath. In order to secure proper ground clearance with 6 ft. between circuits a 40-ft. pole will be found necessary. The straight line representing this type of construction is the one to the extreme right. A span length is next assumed—300 ft. in this case. Where the straight line representing type of construction intersects the line corresponding to a span length of 300 ft., a value of 51,500 lb.-ft. is read off the abscissa scale. A pole which will withstand this strain is any pole whose curve passes this 51,500 lb.-ft. line. If a safety factory of about two is desired for the proposed line the proper poles will be a class 3, 40 ft. with a safety factory of 1.5 or a class 2, 40 ft. with a safety factor of approximately 2.4.

With the new classification of wood poles, any pole of a given class and length is of equal strength. That is, a class No. 1 Western red cedar pole is equal in strength to a class No. 1 Southern yellow pine or Northern white cedar. For convenience in arriving at actual values, Western red cedar poles were used, taking 5,600 lb. per square inch as the ultimate fiber stress.

In the new pole classification the circumference of Western red cedar poles at the ground line is given. By reference to the tables in the National Electrical Safety Code, the resisting moment of a Western red cedar pole with a given circumference is determined. As these tables are based on 5,000 lb. per square inch, they must be multiplied by 1.12 to bring the values up to the adopted standard of 5,600 lb. per square inch.

Using this value of moment as the abscissa and safety factor as the ordinate the family of curves for various grades and lengths of poles is drawn. It will be noted that only the odd classes of poles are shown. The curves for the even classes will lie approximately midway between adjacent odd classes.

Another family of curves representing various types of line construction are drawn on the same sheet for span lengths 100 to 400 ft. These curves are straight lines as the resulting moment on a pole varies directly with the span length. The type of construction varies somewhat for every company, and for this reason these curves will not satisfy every condition. Bare copper wire was used in this case. Curves could be drawn equally well for aluminum wire and insulated wire.

All types of construction are not represented by these particular curves and each company should determine which types should appear on its set of curves. A small amount of study of this subject will convince any one of the accuracy and rapidity secured by this method.

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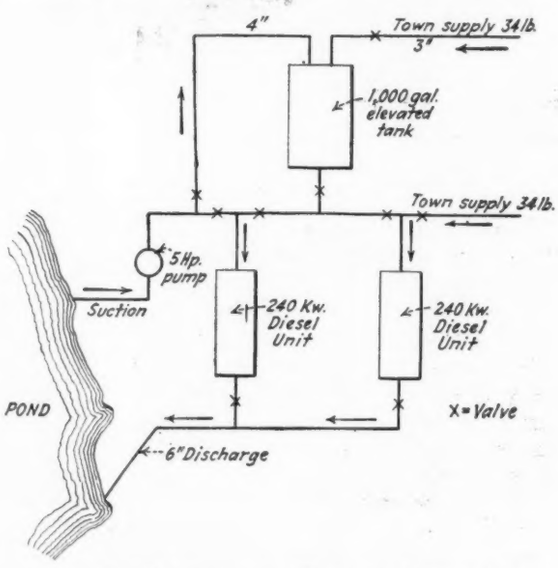
Multiple-Source Cooling Water Safeguards Service

To guard against service interruptions from failure of cooling water for its Diesel engines, an Eastern central station operating two 240-kw. units provides two independent pipe lines from the town supply in addition to the suction line normally utilized from a pond and wells adjacent to the plant. In regular operation water at from 50 to 90 deg. F. in temperature is pumped from the pond into a 1,000-gal. tank mounted in the engine room about 30 ft. above the floor. Make-up is supplied when necessary by either of the town lines. Either unit can be served from any of the three sources and the failure of one line leaves two others in reserve.



Flexible water supply for engine cooling insures continuous operation

Yield Must Be Independent of Current Money Costs

Do current low costs of money and general market conditions justify lowering the rate of return on capital invested in the utilities? Mr. Nash here discusses the probable effects of such action upon utility credit

By L. R. NASH

Stone & Webster Service Corporation, Boston, Mass.

EXISTING unprecedented economic disturbances have brought about conditions relating to public utility service which in some respects are a menace to their continued successful functioning. The general level of wholesale prices has recently fallen from the so-called plateau, which was about 50 per cent above the pre-war level, to substantially this earlier level, and a number of state regulatory commissions have referred to this reduction as having a significant bearing upon the value of utility property for rate-making purposes.

It is not inevitable that utility construction costs should follow the general trend of wholesale prices. As a matter of fact, while there has been a material reduction in such costs, influenced in varying degrees by the unprecedentedly low cost of copper, the general level of utility costs is still more than 50 per cent above pre-war levels. Electric power costs are for the moment slightly lower, but those of other classes of utilities, such as electric railways and gas, are substantially higher. An obvious reason for this difference between the indexes of wholesale commodities and public utility construction costs is the high percentage of skilled labor which enters into the cost of public utility equipment and supplies and their installation. The wages of skilled labor have not been subject to reductions similar to those of other labor and raw materials.

Coincident with the lower costs of materials, we have seen a marked reduction in cost of money. This reduction has affected both interest rates on borrowed funds and the equity investments in all classes of corporations. This fact has also been recognized by the regulatory commissions and has led to the establishment of unprecedentedly low rates of return in certain recent rate cases. Rates of return as low as 5 per cent are recorded. Such rates of return are obviously lower than the cost of money which has been invested in public utilities. It is lower than the average cost of borrowed money, to say nothing of the higher yield necessary from equity funds because of the added risk which they assume.

Weighted average capital cost the true index

Public utilities differ from other industries, particularly those in the mercantile class, in the permanence of their investment. The average utility requires five to six years to turn over its capital, whereas a mercantile establishment will do so in a few months and the average industrial plant in less than one year. The annual additions to utility fixed capital ordinarily amount to materially less than 10 per cent of the existing capital. It, therefore, follows that although capital currently added may be at relatively low rates, the effect upon the entire capital structure is slight. This is true, although to a lesser degree, where obligations have been retired and replaced by others having substantially lower interest rates. It must be remembered, however, that such retirements involve premiums, as well as brokerage fees on substitute issues—all of which factors in the rate of return should be considered by regulatory commissions.

It is well established that the fair rate of return for utilities must be high enough to attract capital to the business in competition with other investment offerings. Public utility obligations rarely mature under twenty years, and sometimes run for 40 or 50 years. The issues

of preferred and common stock commonly continue throughout the life of the corporation. The investor in any of these securities determines the price he is willing to pay for them on the basis of the probable average yield from other investments having similar risks during the period he expects to hold them. He is not interested in transient fluctuations in the money market during the period of his expected holding.

Even if an individual investor were influenced by prevailing market conditions to sell or add to his holdings, it would have no effect upon the issuing corporations. Their cost of money is fixed at the time of the sale of their securities and continues as long as those particular securities are outstanding.

The average cost of all utility capital is the weighted-average cost of all issues made during a long period of years. Some issues will have low yields, while others will be high, depending upon market conditions when financing is necessary.

Public utilities are obligated at all times to render service to any applicant in their field of activity. Demands for service are apt to be greatest during periods of prosperity when money costs are highest, and facilities must be expanded accordingly. Other industries have no such obligations and may expand their plants under favorable money-market conditions. It follows, therefore, that, in addition to the other considerations previously discussed, the authorized return from utility investments should be slightly higher than from other investments with similar risk.

Liquidation sales do not affect original capital cost

The past two years have witnessed unprecedented changes in the money markets. Rates for borrowed money have fluctuated between a peak nearly twice the normal fair return on public utility property and a minimum of about one-half that normal. Securities in vast amounts have been sold by their unfortunate holders at prices having no relation to their intrinsic value, sometimes yielding returns to the purchasers far in excess of any return recognized as reasonable for public utilities. So far as public utility securities were included in such transactions, it meant loss or gain to owners involved, but in no way affected the cost to the utilities of these securities when originally issued, which cost continues as long as they remain outstanding. The significant fact, therefore, is the necessary yield at time of issue rather than at some subsequent date when yields may temporarily be higher or lower. In some cases these yields are fixed by actual contract; in others the obligation is only implied or contingent, but, nevertheless, entitled under regulation to some assurance of stability in yield.

Still another factor often overlooked is involved in the fixing of a fair return for public utilities. The return from a new issue of securities is to some extent uncertain, depending upon its specific purpose, its size in relation to outstanding capital, and other factors aside from general market conditions at the time of issue. When the issue has become "seasoned," its market price may be materially lower than the original offering price. This is particularly true of bonds, again indicating that the market value of utility securities at any particular time has no necessary relation to the original issue price or to the fair rate of return which should be authorized.

It may be contended that reasonable returns to utility investors are supposed to be based upon fair value of property devoted to public service, and should have no direct relation to capitalization, upon which this discussion is predicated. Such contention may apply to cases which have reached our higher courts, but it is well known that the sympathies of many of the regulatory commissions are directed toward actual investment, which, under regulation, is the basis of security issues. Under the recent lowering of construction costs to levels well below those existing a decade or more ago the difference between cost of reproduction of and actual investment in complete utility properties has so diminished as to make the argument over the relative merits of those two methods of determining value largely academic.

Regardless of any discrepancies which may exist between capitalization and fair value, it is obvious that the recent exceptionally low authorized rates of return referred to herein were based upon the present low cost of money as determined from yields of outstanding securities. If it is reasonable to use such a method of determining fair returns, it is equally proper to point out the weakness and injustice of the method.

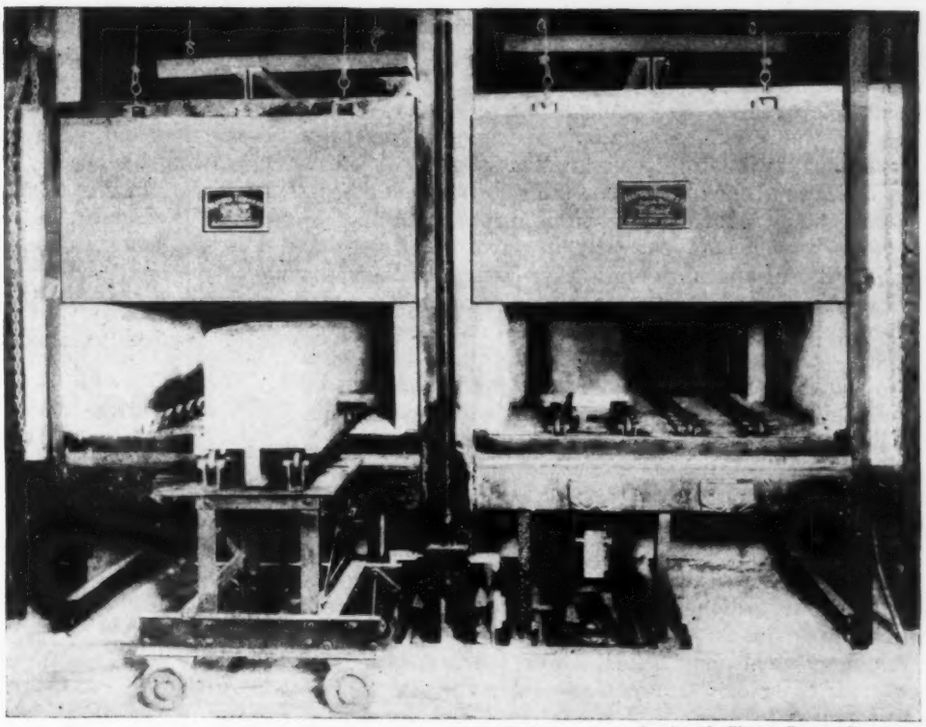
Existing conditions with respect to both commodity costs and costs of money are believed to be subnormal, and higher levels are to be expected with return of more stable and prosperous business. In the meantime orders of regulatory commissions which result in drastic reductions in distributable income of public utilities are of little benefit to the great bulk of utility customers.

The average domestic electric customer pays not more than 10 cents a day for his service, and the reduced return in question affects this cost by only a minor fraction of one cent. If such reductions so impair the credit of utilities that additional capital for expansion cannot be secured or, if secured, only through such unbalancing of the capital structure as will lead to future embarrassments, it cannot be said that such customers are benefited. Larger customers whose cost of service is fixed by competitive conditions do not need regulatory protection.

Fair return basis of credit standing

Public utilities have shown remarkable stability during the present period of depression. The losses in revenue and in output of both electric and gas companies have been negligible. This stability has largely been the result of steadily improved credit in which the finding of commissions and courts that a return of 8 per cent or thereabouts was reasonable has been an important contributing factor. Without such credit the utilities would have been unable to expand their service in fields which have been primarily responsible for the stability of their incomes.

It is to be hoped that the transient character of prevailing money-market conditions and the limited extent to which the cost of money at any particular time, whether high or low, can affect the average cost of all money invested in public utilities will have more careful attention at the hands of regulatory authorities and that the ability of utilities to meet all demands for expansion of their service will not be impaired by ruinously low rates of return. Such rates, even though applied for limited periods, would have far-reaching effects upon credit.



Courtesy the Electric Furnace Company

Carburizing furnaces save labor and insure quality production

Electric Carburizing Saves Labor of Eighteen Men

"WITHOUT the modern furnace the application of metallurgical principles to production manufacturing would be impossible and with its assistance the uncertainty of uniform physical qualities in steel has been largely overcome," stated E. F. Davis of the Warner Gear Company, Muncie, Ind., at a recent meeting of the Society of Automotive Engineers in Boston. "The pressure for reducing material costs due to competition, the urgency for lighter sections, the removal of metal wherever possible and the increases of stresses have compelled the engineer to lower the factor of safety; consequently the metallurgist has been forced to eliminate as far as possible the variables which enter into the manufacture and heat treatment of steel. Progress toward the elimination of manual control has done more than any one thing toward raising the dependability of steel parts in service. By substituting a mechanical furnace where the elements of time and temperature are under sensitive control and making such a furnace as automatic as it is practical the source of the variables and the men who caused them are eliminated.

"During the last ten years," said Mr. Davis, "I have seen carburizing costs drop from 10 cents to 9 mills per pound. With two men our two 90-kw. electric carburizing furnaces are producing an equivalent output to twenty men by the old box furnace practice. The present furnaces are of the recuperative type. The counterflow principle by which the outgoing boxes give up a portion of their heat to the incoming boxes conserves heat so that the boxes leave at about 700 deg. F. on the outside and 1,100 deg. on the inside. The furnace operators' duties consist of loading and unloading the boxes and they have nothing to do with the furnace operation. We have standardized cycles of pushing for 0.03 to 0.06-in. cases, which are held within 0.005-in. variation. Control of carburizing temperatures is held within 10 deg. Provision is also made for the mechanical handling of carburizing compound and mixing a definite amount of new with the old. The size of the carburizing grains is also under control to allow for the abrasive action in mixing, and effective suction fans remove the dust. We have no men adjusting burners and trying to hold the furnace to the required temperature; no trouble with heats going wild due to observation failure, and no variations in carburizing depth such as was common in box furnace practice. We have no arduous toil in loading boxes into the old-fashioned square furnaces, nor trouble due to the case spalling in grinding on account of excessively high carburizing temperatures and excessive cementite on the carburized layers. We have very little trouble on account of soft spots, have done away with field troubles due to defective carburizing and do not have gears returned on account of being too thin and excessive wear.

Importance of controlled annealing

"Our plant is engaged in the manufacture of gears and free-wheeling units. The annealing of steel is extremely important to us. The machining department demands ease of cutting for high speed and feeds in

blanking and the gear-cutting departments demand smooth tooth finish. In nearly all types of gear there is a phase in the microstructure whereby the maximum machinable qualities are obtained. Some of these structures are more or less fugitive and require carefully worked out heating and cooling cycles in order that this may be accomplished. It is one thing to establish a heating and cooling curve in a scientific manner and another to make it work out correctly in furnaces disgorging nearly a ton of annealed forgings an hour. Without the continuous annealing furnace under automatic control such a process could not be done when annealing is performed *en masse,* but with gear forgings passing through various zones of heating and cooling we are able to be assured that the correct microstructure will obtain within the limitations of steel uniformity. The continuous furnace has demonstrated the fact that various heats of steel of similar chemistry do not respond alike to standardized annealing methods, and the steel mills are yet lacking in their ability consistently to produce a uniform product.

"The economies of continuous annealing are not principally in fuel saving or labor reduction, though both are tangible items. The major saving is in faster machining speeds and feeds, lower tool expenses, the reduction of rejects due to noisy gears and the general improvement in production conditions. The continuous sheet normalizing furnace has been of great service to the automotive industry in producing a quality of sheet suitable for the deep drawing operations necessary for fenders and bodies. This process is similar in exactitude to gear annealing, for definite cycles must be maintained in order that the correct microstructure for maximum deep drawing qualities will result. The bar normalizing and heat-treating furnaces now installed in some of the leading steel mills are giving us long bars normalized or heat treated to a degree impossible in the older car type equipment formerly used.

"Nearly all classes of automotive parts are now being heat treated in continuous furnaces. We have V-type pusher furnaces for piston rings and small shafts, alloy belt-type furnaces for bolts, screws, coiled springs, ball and roller bearing rings, and pusher types for flat springs, crankshafts, front and rear axles and camshafts. I have witnessed the operation of one continuous furnace where three different hardnesses were obtained within narrow limits in one heating operation.

Fuel values of minor significance

"If comparative B.t.u. cost were paramount, coal would be the logical fuel on account of its relative cheapness. Our industry is in an area where 1,000-B.t.u. gas is available and cheap, but our largest and smallest installations are electrically heated, our intermediate units being gas-fired. Neither do I assert that electric heat is an assurance that the furnace will heat more uniformly than gas or oil. A well-designed gas furnace is better than a poorly designed electric one, and *vice versa.* I have observed certain types of electric furnaces that would not harden carburized work without soft spots, due to the formation of closely adherent oxide on the surface, and I have seen others which were nearly ideal in the hardening results obtained. The proper application of any fuel is a vital factor in any installation and intimately affects the economies of operation.

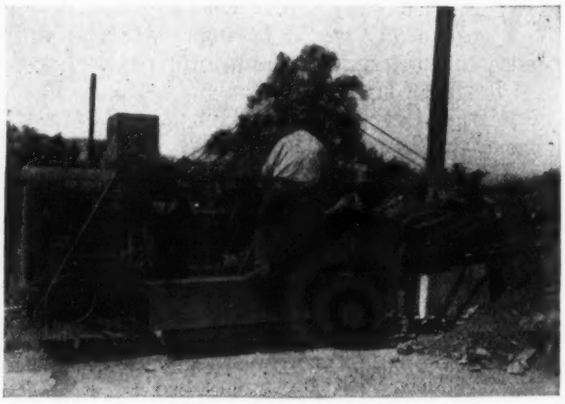
"The continuous furnace is not for the small job shop, but it is ideal for the various industries specializing in the manufacture of automotive parts where the output is more or less standardized and where production quantities justify the expenditure. These furnaces are only economical when in continuous service. It costs $50 every time our gas-fired annealing furnace is brought up to heat and nearly $60 to bring our electric furnace up to carburizing temperature. When a plant attains a certain size, mistakes must not be made and troubles must not happen or anything occur which will interfere with the smooth flow of material through the different operations.

Seek to eliminate roughing operations

"Much remains to be done in furnace development. The forging of steel is about due for an upheaval. Mighty presses are today being built of such rigidity that nearly perfect forgings are the probable outcome. If the problem of scale can be solved—and the outlook is hopeful—it will be easy to make forgings within a few thousandths of an inch of finished dimensions. Great economies would flow from the elimination of roughing operations. If steel can be forged and annealed without loss of size due to surface oxidation and the troublesome operations of pickling, tumbling and sandblasting omitted, real progress will be achieved. Furnaces can be designed to accomplish these things on a production basis, but the equipment is revolutionary in contrast with the crude types of furnaces still prevalent in the forging industry."

▼

Trencher Saves 75 per Cent Over Hand Labor



Digging duct and pipe-line trenches with small trencher effected large saving on substation job

By careful planning the various duct lines and pipe lines at the Newark substation of the Pacific Gas & Electric Company were consolidated into several main groups and the trenching was done with the use of a small standard trenching machine. This equipment, shown in the accompanying illustration, is driven by a 27-hp. engine and is capable of digging a trench up to 22 in. in width to a depth of 5 ft. 6 in. Most of the duct-line trenches were dug to a depth of 3 ft. 6 in. Doing the work by this method cost roughly only 25 per cent of what the job would have cost with hand digging.

This Ultraviolet Situation

By M. LUCKIESH
Director Lighting Research Laboratory, General Electric Company, Cleveland, Ohio

Curative values of less importance than are preventive ones.
Summary of evidence argues for artificial sunlight.
Combination of health radiation and illumination advocated.

THE use of ultraviolet radiation naturally divides into two parts. The one includes cure of diseases or rectification of disorders in human beings and in other animals. The other encompasses prevention of disorders or the maintenance of the health of healthy or near-healthy persons. The former is the province of the medical profession and is beyond the scope of this discussion. The prevention of illness and maintenance of health are the province of any art, science or individual that has a contribution to make for the betterment of human beings and other living things, such as animals and plants. The manufacture and sale of safe ultraviolet applicators or treatment devices for use by healthy or near-healthy individuals are the legitimate province of any one. Likewise, dual-purpose lighting, which combines radiation for health with light for seeing, is a natural contribution to the welfare of human beings by artificial light, which already has so much to its credit in the development of civilization. Artificial sunlight should be as safe as sunlight. If it is, so-called healthy human beings are protected by a very large factor of safety and the advice of a physician is no more necessary than in exposure to outdoor sunlight.

So-called healthy persons

In considering ultraviolet radiation for health maintenance the purchaser is confronted with a seeming confusion of data, claims, criticisms and motives. Notwithstanding these conflicting cross-currents, there is a definite trend of experience toward the realization of beneficence in ultraviolet radiation in the maintenance of the health of healthy persons and in the improvement of the health of the near-healthy. Unquestioned direct proof of this beneficence is difficult to obtain. Fairmindedness recognizes the difficulties and gives consideration to logic and indirect evidence.

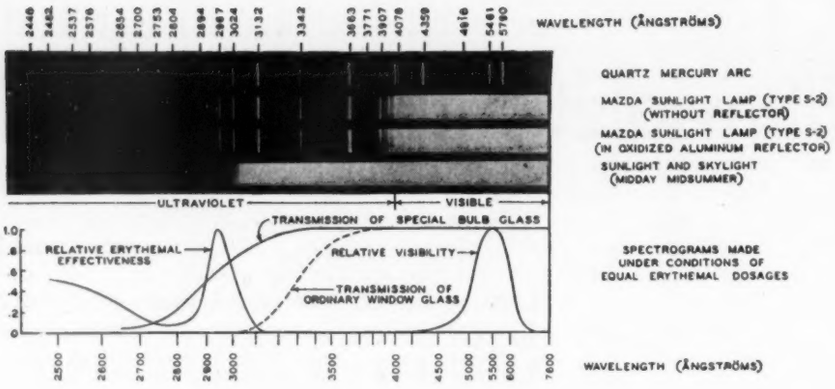
Ultraviolet radiation is firmly established in the successful treatment of disorders and to a lesser extent in the prevention of them. Viewed narrowly, it is impossible to prove that anything applied to, or indulged in, by healthy human beings maintains their health. We believe in exercise, frequent baths, fresh air and balanced diet, nothwithstanding the fact that many persons live long without them. Indeed, if one wishes to quibble he may question the efficacy of many practices which are accepted as being beneficial to the health of human beings.

Healthiness is a matter of degree of departure from theoretical, perfect health. As illustrated, a circle may be considered to contain all human beings. At the center are those hypothetical persons who are perfectly healthy. Somewhere between the circumference and the center another circle may be drawn. Outside of this circle are the ill persons and inside are the so-called healthy persons who are actually near-healthy. Such a view provides justification to some extent for drawing conclusions from the cure of disorders in regard to health-maintenance by means of ultraviolet radiation. For example, many persons with secondary anemia are working for a living. There is evidence that ultra-violet radiation improves this condition. Certain skin affections are cured by ultraviolet radiation and certainly mild cases, at least, can be cured while persons work under artificial sunlight. Other disorders which have responded to ultraviolet radiation are found among the near-healthy adults who work for a living.

Some extensive experiments have been conducted pertaining to the prevention of common colds by means of ultraviolet radiation. The results are conflicting and are

Perfect health is a theoretical ideal not completely standardized

Most so-called healthy persons may be classified between this and an indefinite border line of so-called illness.


WAVELENGTH (ÅNGSTRÖMS)
QUARTZ MERCURY ARC
MAZDA SUNLIGHT LAMP (TYPE S-2) (WITHOUT REFLECTOR)
MAZDA SUNLIGHT LAMP (TYPE S-2) (IN OXIDIZED ALUMINUM REFLECTOR)
SUNLIGHT AND SKYLIGHT (MIDDAY MIDSUMMER)
ULTRAVIOLET
VISIBLE
TRANSMISSION OF SPECIAL BULB GLASS
RELATIVE ERYTHEMAL EFFECTIVENESS
RELATIVE VISIBILITY
TRANSMISSION OF ORDINARY WINDOW GLASS
SPECTROGRAMS MADE UNDER CONDITIONS OF EQUAL ERYTHEMAL DOSAGES
WAVELENGTH (ÅNGSTRÖMS)

Some of the spectral characteristics of sources of ultraviolet radiation, of glass and of the sensitivity of the eye and of the skin

not convincing. In the first place, considering the variables which were not controlled, no experiment has been performed with enough subjects to be conclusive. Furthermore, the applications have been made in the form of treatments upon nude persons with high-powered sources operating a short time. This is a far different condition than exposure to artificial sunlight of low ultraviolet intensity over much longer periods of time. The long exposure to mild ultraviolet in dual-purpose lighting is more attractive for several reasons than the high-powered short-exposure dosages. In the case of the latter the subject usually takes the "treatment" before retiring. In the experiments on the prevention of common colds the subjects did not do this and colds may actually have resulted from the exposure after the treatment. Furthermore, in one of the researches, which has been given wide publicity, ultraviolet radiation of much shorter wave lengths than are present in sunlight was used. This is a typical example of the difficulties and pitfalls involved in such researches, even though they are conducted very creditably.

Threshold dosages

During the past few years of development of the foundations for artificial sunlight and dual-purpose lighting much has been accomplished toward co-ordinating physics and therapeutic practice. Much of the literature pertaining to radiation therapy is of little or no fundamental value, owing to the lack of adequate physical data pertaining to the spectrum, to the intensity of radiation and to other physical factors. No attention had been paid to threshold dosage, which is not only of great practical importance but is of fundamental importance. For example, no conclusions can be drawn in regard to the effect of area and pigmentation of the skin exposed, unless threshold dosages are used.

Extensive and tedious researches, aimed to establish the threshold dosage, have been in progress for several years. Now it is known that very much smaller dosages than have been used in therapeutic practice are sufficient for the cure or prevention of rickets. It is now known that rickets can be prevented in children by exposures of a few minutes per week to modern, powerful sources at a distance of 30 inches. Perhaps the most epochal researches ever performed are the experiments now in progress with tungsten-filament lamps in special bulbs. Rickets has been cured with six-hour daily exposure to 60 foot-candles and the threshold has not been reached. These experiments in threshold dosage have already shown that practicable intensities of illumination for seeing are sufficient for the cure of rickets. It is now known that only a fraction of a dosage, which produces a perceptible erythema, is necessary daily to cure rickets.

Prevention of rickets requires even lesser dosages, the indications being that only one-third, and possibly as little as one-tenth, of the curative dosage is necessary to insure children against rickets. Inasmuch as healthy children and adults need no extraordinary repair work, prevention requires less dosage than cure. There is still in progress a great deal of work on threshold dosages which promises to establish the necessary intensities of artificial sunlight far below what some time ago appeared to be practicable from an economic viewpoint. Inasmuch as duration of exposure is as important as ultraviolet intensity, dual-purpose lighting has long been promising.

The meaning of rickets

The human being is a very complex organism. Life processes are intricate and complete control of all influences upon life and health is impossible for large groups of persons. Physiological, biological and medical researches have achieved wonders, but they have not yet provided simple measuring sticks for appraising the influence of ultraviolet radiation upon human beings. Although ultraviolet radiation of certain wave lengths is known to be beneficial in various disorders, its value as a preventive of illness and as an adjuvant in cases of healthy and near-healthy persons is generally arrived at by indirect or qualitative data. A good case can be made out for summer sunlight or its artificial equivalent by studying its effect upon appetite, sleep, nervous condition and other factors. Such data are not convincing to those who insist upon definiteness equivalent to the measurement of lengths with a rule. To those who appreciate the complexity of the human organism and the difficulties of physiological and psychological measurements such data are more convincing.

The only well-developed method of appraising the biological effectiveness of ultraviolet radiation is the prevention and cure of rickets. Therefore, it is of interest to know the meaning of rickets and to interpret the results of data yielded by this method.

The incidence of rickets over the entire earth is at least coincident with sunlight deficiency. It has been estimated from clinical records that as high as 86 per cent of the small children in cities have rickets. Rickets means more than eventually deformed children and crippled adults. It means deficiency in bones, teeth, muscles and blood of growing children. There are nutritional and even psychic disturbances, and possible functional and organic disabilities may linger after adult life is reached. There is evidence that the resistance of rachitic children is undermined, predisposing them to pneumonia and possibly to other diseases. Unfortunately, diagnosis lags far behind the damaging disorders. Artificial sunlight is known to prevent rickets

and its obscure complications. Therefore, at least artificial sunlight has been adequately proved to be beneficial and health-maintaining in the case of growing children. Rickets, as it is generally recognized, is a far-reaching disease of growth. Artificial sunlight can serve the millions of children in the home and school.

But are not the same processes at work in replacement in adults that are at work in replacement and growth in children? It is a reasonable assumption that if ultraviolet radiation increases the calcium in the blood, which hardens bones and teeth and performs other functions, it will perform these functions for adults. During the World War there developed in adults in Middle Europe a disease known as *osteomalacia,* due to deficient diet. It resembles rickets in many ways and lends support to the theory that the same processes which contribute toward growth should be normal in order to replace bodily material of adults.

The following tabulation is interesting in this connection, as well as in the matter of threshold dosages necessary:

Children, with rickets	
Ordinary replacement	Health
Normal growth	Growth
Extraordinary repair	Cure
Children, without rickets	
Ordinary replacement	Health
Normal growth	Growth
Adults, near-healthy	
Ordinary replacement	Health
Moderate repair	Cure
Adults, healthy	
Ordinary replacement	Health

Such a view as the foregoing emphasizes the close relation between children and adults as "going concerns." The difference between them is largely the additional strain upon life processes to take care of growth. The difference between healthy and ill persons is the additional strain upon life processes to take care of repair. Thus, it is seen that rickets may be considered not only a measuring stick applicable to ultraviolet radiation in relation to children, but it also is related to healthy adults.

Noted authorities are convinced that the application of ultraviolet radiation during the World War in Middle Europe would have reduced the severity of *osteomalacia.* Of course, the latter is a disorder caused by extreme conditions, but, as already pointed out, the effectiveness of ultraviolet radiation upon healthy adults must depend partially upon evidence from the realm of illness. The hardening of bones and teeth, the proper calcium content of blood and the other known effects of ultraviolet radiation are common to children and adults.

Spectral facts of artificial sunlight

The short-wave limit of the best summer sunlight is near λ2900 (wave length in Angstrom units). From various considerations it has appeared desirable to establish λ2800 as the short-wave limit of artificial sunlight. Inasmuch as the biological effectiveness of ultraviolet radiation is established for wave lengths not transmitted by window glass, the practicable long-wave limit is at λ3100 or possibly λ3200. Radiation shorter than λ2800 is particularly irritating to the external membranes of the eyes. Therefore, the important spectral region of a reasonably safe artificial sunlight lies between λ2800 and λ3100. This radiation produces erythema and the spectral erythemal effectiveness of radiation has been fairly well established. For this reason and others, minimum perceptible erythema (MPE) was early adopted as a measure of dosage. In order to connect the ultraviolet dosage with lighting, the foot-candle-minutes (or hours) for the production of MPE has been used as a basis of design of dual-purpose lighting installations and for comparing different sources, equipments and installations.* New units, standards and terms are now under consideration which should place artificial sunlighting upon a sound foundation.†

On the preceding page are typical spectrograms and graphs which illustrate the requirement of sources of ultra-violet radiation, of special glasses, etc. The spectrum of the quartz mercury arc is shown at the top with the wave lengths of the various lines of the mercury spectrum. A variety of filters is available for limiting the spectrum at the short-wave end. The second and third spectrograms are those of the radiation from the "Mazda" sunlight lamp (type S-2). It is seen that the bulb transmits practically no energy shorter than λ2800. The fourth spectrogram indicates the short-wave limit of summer sunlight. Actually, this limit extends commonly to λ2950 and sometimes further.

Selling artificial sunlight

This necessarily brief survey of a few of the phases of an extensive and complex subject is presented chiefly to aid in the contemplation of a new and promising phase of lighting development. Glimpses of the efficacy of artificial sunlight are seen in the conclusive direct data, in indirect evidence, in the logic of sunlight as an environmental factor and in the accumulated experience of humanity The lack of complete and extensive, direct proofs of the beneficence to healthy persons is in no way discouraging to those who are sincerely developing the field. Furthermore, there need be no suggestion of quackery in these sound developments, even though it has been present in the sale of cure-all devices. In fact, therapeutic practice is not entirely free from it.

There is a universal faith in the value of summer sunlight. On every hand we see its necessity in the life processes of plants. It is not surprising that, as animals developed mobility, they also acquired factors of safety and reservoirs of essentials for protecting them from their ignorance. Instinct, the accumulated experience of countless generations, directs human beings and other animals to utilize sunlight. Adequate consideration of the importance of environment can scarcely conclude that sunlight is not of direct benefit to the life processes of human beings. Every one is still a product of outdoors because, biologically speaking, the human race came indoors yesterday. That human beings need sunlight indirectly is too obvious to be discussed. That human beings need it directly is difficult to prove. Doubtless, the development of storage and of reserves, which mobility of animals demands, increases the difficulty of proving this. This elusiveness is also enhanced by the crudity of the sciences involving the life and health of human beings. Nevertheless, there is much direct and indirect evidence of the value of sunlight or of its equiv-

**Artificial Sunlight, M. Luckiesh, D. Van Nostrand Company, New York, 1930.*

†Nomenclature and Standards for Biologically Effective Radiation, M. Luckiesh and L. L. Holladay, Journal Optical Society of America, 21, 1931, 420.

alent. The medical profession uses ultraviolet radiation extensively as a cure, as a tonic and as a preventive. It recommends sunlight in many ways.

Aside from all this, there is an extensive, persistent and increasing faith in artificial sunlight. With the evidence and logic to strengthen its faith, the lighting industry has a right to sell dual-purpose lighting to those who have faith in it. Home-treatment equipment has been and is widely sold to those who believe in the beneficence of sunlight. The foundation for this field is the same as that for dual-purpose lighting. Artificial light has successfully challenged natural daylight in controllability, in cost, in quality and in beneficence. By providing dual-purpose lighting to those who have faith in sunlight, lighting development has brought another environmental factor into the indoor world of civilization.

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220-Kv. Transposition Uses Standard Line Material

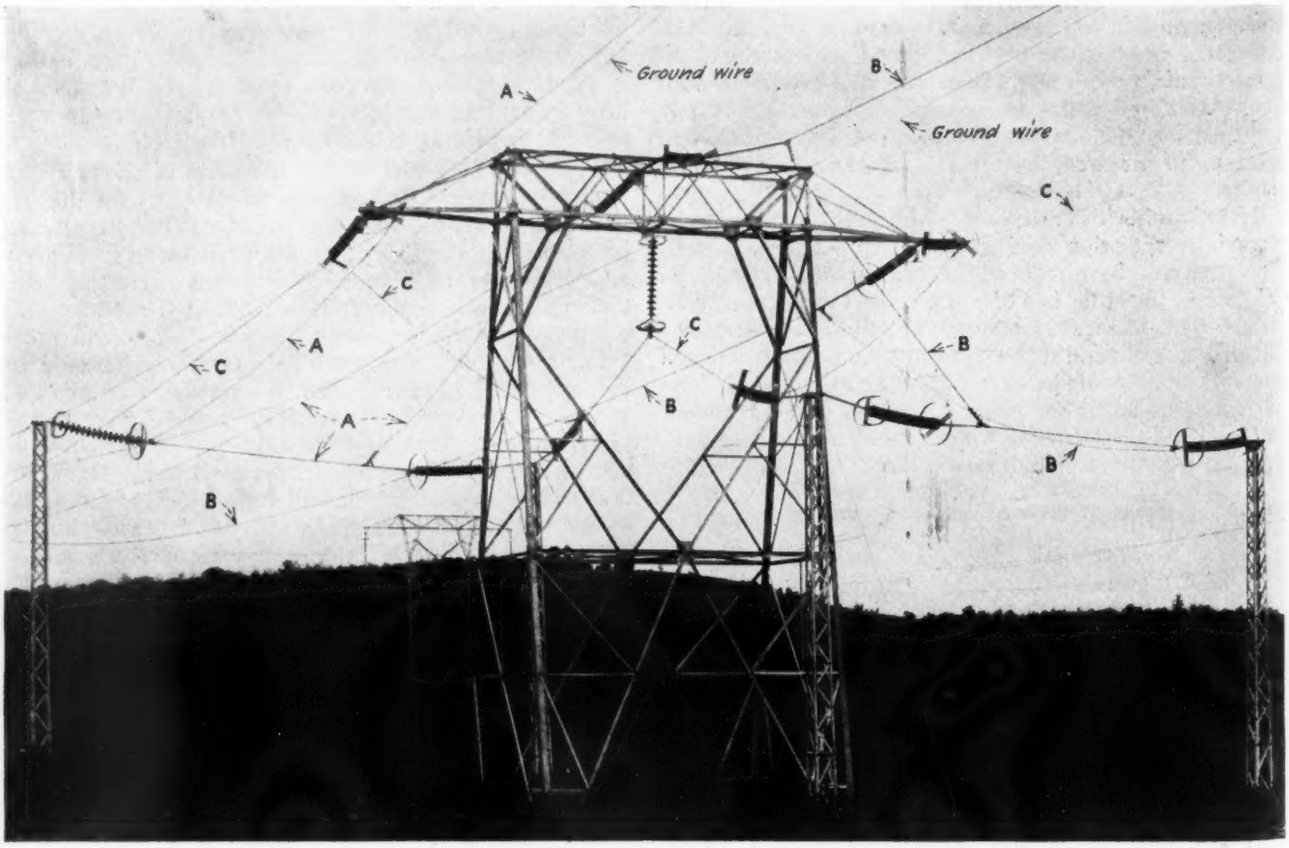
By C. A. BOOKER
Assistant Transmission Line Engineer
New England Power Engineering & Service Corporation

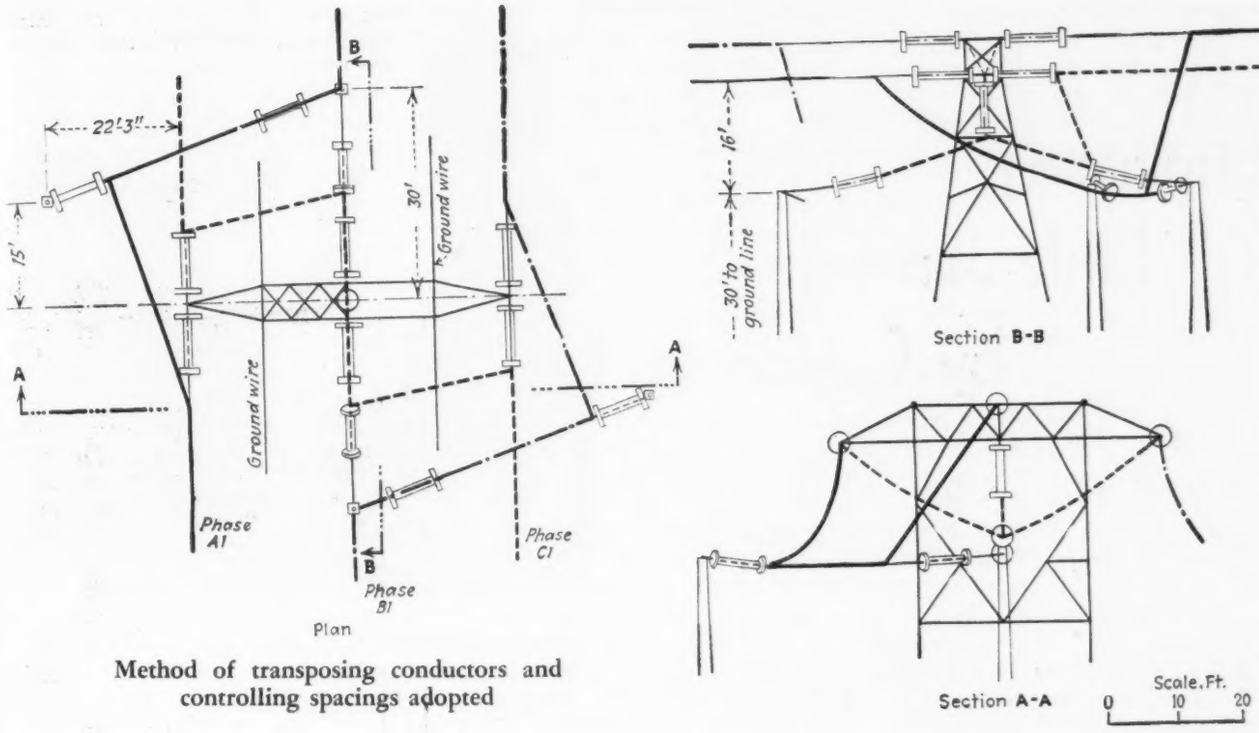
In transposing the 220-kv., two-circuit line of the New England Power Association between Fifteen-Mile Falls and Tewksbury it was necessary to develop a scheme by which the conductors could be transposed at a fixed point without resorting either to higher towers or vertical configuration, and if possible utilizing a standard structure. As described in the ELECTRICAL WORLD September 6, 1930, page 443, every effort was made in the design of this line to keep the conductors as low as possible to minimize inductive disturbances. In attacking the transposition problem various schemes were developed in which brackets, weights, stiffening members, etc., were used to hold the conductors in place when passing from one position to another. Only one of these seemed to satisfy the difficult condition of maintaining adequate clearances between phases, and from phase to ground. The scheme adopted uses a standard strain tower with the center conductor raised to the top of the crossarm and all auxiliary equipment, including the actual transposition itself, supported by independent steel poles.

The center insulator strings are supported at the top of the crossarm and assembled with 18-ft. extension bars between the end disks and strain clamps. The extension bars were used so that the conductor could pass directly from the strain clamp to the bus below without the necessity of a "T" connection. The additional height of the center wire provides vertical separation so that a single

220-kv. transpositions with standard strain tower

Four fabricated steel poles aid in maintaining low ground clearances and liberal spacings. Phases A, B and C can be readily followed through in this illustration.





Method of transposing conductors and controlling spacings adopted

wire bus can be strung through the "V" of the tower between two steel poles located directly under the center wire at either side of the tower. To this bus, which is supported in a fixed position by a vertical idler string at the center of the tower crossarm, the incoming right-hand and the outgoing left-hand wires are attached with a fairly taut jumper, thus transferring one outside wire from the right-hand side of the tower to the left-hand side.

The center wire is dropped directly from the strain clamp at the end of the 18-ft. extension bar to another single wire bus, which passes from one of the poles previously mentioned in a direction about right angle to the line and 13 ft. below the right-hand conductor to another pole located 45.5 ft. to the right of center line. From the outer end of this bus a jumper about in the position of a normal dead-end jumper is taken to the right-hand conductor on the far side of the tower. The left-hand conductor is treated in the same maner as the right-hand, except that its progression is reversed, eventually being connected to the center wire on the far side of the tower.

Single-wire buses are strung at a tension of about 1,000 lb. between galvanized fabricated steel poles 30 ft. above ground. The clearances are 8 ft. minimum between live members and ground (except between grading rings) and 13 ft. minimum phase to phase. Standard insulators and hardware were used throughout with extension bars at certain places to give increased clearance.

The transposition was made with the introduction of a single splice in each phase. These were made by bolting together in one of the jumpers male and female aluminum terminal lugs compressed on the ends to be spliced. The splice was introduced so as not to delay construction progress, but it is probable that in the event of the future construction of a similar line the splice would be eliminated by making the transposition when the wires are being strung.

Structural Welding Takes 8 Kw.-Hr. per Ton

Energy and electrode consumption data on a welded building job was reported by P. N. Vinther in a paper* at the recent meeting of the A.I.E.E. at Kansas City. The main portion of the building (Dallas Power & Light Company office, Dallas, Tex.) is nineteen stories high with a two-story annex, involving in the welding 1,215 tons of structural steel. It has heavy wind bracing in both directions. As far as possible the welding of shelves, angles and gussets was made in the shop to minimize the field welding, especially that which would require overhead operation. The operators were selected after rigid tests of their proficiency.

Data for a Welded Building

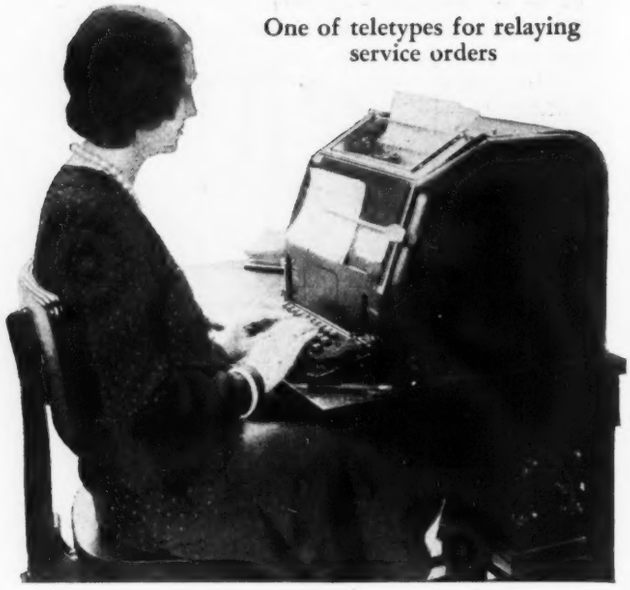
Description		Shop Welding	Field Welding
Electrode bought	Pounds	7,100	4,650
Electrode melted (assumed 70 per cent)	Pounds	4,970	3,255
Energy used	Kw.-hr.	No record	9,460
Total steel welded	Tons	1,215	1,170
Welders' time	Man-hours	3,140	1,767½
Total length of ¼-in. fillets	Inches	97,500	56,415
Total length of ½-in. fillets	Inches	25,400	17,842
Total length of all fillets	Inches	122,900	74,257
Fillets per ton of steel	Inches	101.2	63.5
Fillet deposited per man per hour	Inches	29.2	42.0
Fillet deposited per man per eight-hour day	Feet	26 ft. 1½ in.	28 ft. 0 in.
Fillet deposited per pound of electrode bought	Inches	17.3	16.0
Fillet deposited per pound of electrode melted	Inches	24.7	22.8
Fillet deposited per kw.-hr.	Inches	.....	7.9
Electrode melted per kw.-hr.	Pounds	.....	0.34
Energy required to melt 1 lb. electrode	Kw.-hr.	.....	2.90
Welding man-hours per ton of steel	Man-hours	2.58	1.51
Electrode bought per ton of steel	Pounds	5.84	3.98
Electrode melted per ton of steel	Pounds	4.08	2.78
Electrode melted per hour per welder	Pounds	1.58	1.84
Electrode melted per linear inch of fillet	Pounds	0.04	0.044
Energy required per ton of steel	Kw.-hr.	.....	8.09

*"*Electric Arc Welding in Building Construction.*"

Eliminating Little Journeys by Customers

By ROB ROY MacLEOD

Manager of Public Relations Department
Buffalo, Niagara & Eastern Power Corporation



One of teletypes for relaying service orders

THE light glows on the electric company's switchboard and the operator picks up the call—"Good morning, electric company."

"Give me the purchasing department, please."

"Thank you," and after a moment's wait the customer hears a new voice, "Purchasing department, Hines speaking."

A model telephone conversation? Yes, but listen a minute more. The customer resumes, "I want to purchase some lamp bulbs!"

There follows an explanation that the purchasing department does not sell lamp bulbs, a clicking in the customer's ear, instructions to the operator and finally a connection with the appliance department.

But here is another call. This time the customer asks for the lighting department. One of the illuminating engineers answers, only to find that it is a case of blown-out fuses, which should be handled by the service department. Again the customer is taken on a little journey by telephone to the homes of famous individuals.

Consider, for a moment, the customer's position while he is telephoning. It is unnatural and uncomfortable. It is certainly not conducive to good temper and the sooner the call can be completed the better will be the customer's reaction.

Considerations such as these prompted the Buffalo General Electric Company, a unit of the Niagara Hudson System, to install a central customers' service telephone department. Here all service calls are received and the annoying little journeys are eliminated. It's impossible for the customer to get the wrong department. The young lady who first answers the call will take care of any service request.

Perhaps we can best follow the procedure if we start by picking up the Buffalo telephone directory. Under Buffalo General Electric Company we find this listing:

Customers' Service Dept.	Cleveland 5260
To report trouble, call	Cleveland 5260
To connect or disconnect electric service, call	Cleveland 5260
For electric bill information, call	Cleveland 5260
For appliance repairs, etc., call	Cleveland 5260
General offices	Washington 5700

Experiences with customer calls indicated that this listing would steer 90 per cent of the customers to the right number. But for the benefit of those who might go astray, tie lines are provided between the general office switchboard and the service department so that the small number of calls which go to the wrong board may be correctly routed without asking the customer to call another number.

In the service department is a fourteen-position order table, directly connected to eighteen trunk lines from the central telephone exchange. This switchboard is in the form of a long table and provides for fourteen operators facing each other from opposite sides. Each operator wears a telephone headset, leaving both hands free. Each position is connected to direct lines to the meter and trouble departments and to the order table files, making it possible to get information quickly. Each position is also connected to the interoffice dial equipment. When it is necessary to pass a customer on to some other person in the organization the operator dials that person, explains what is wanted and then makes the connection. The customer is obliged to make his request but once.

Lights glow, when calls are received, at three positions on the table. This reduces to a minimum the possibility of a customer's being kept waiting by a busy board. As soon as one operator picks up the call it disappears from the two other positions.

Speeding the transmission of written orders to the meter and trouble departments, located in the service building, 2 miles away, are five teletype machines—telephone typewriters. Service orders are typed on these machines in the customers' service telephone department and reproduced instantaneously by a similar machine in the service building. This is identical with the system widely used in relaying police reports and in reporting news for the metropolitan dailies. It is simply an adaptation of a successful rapid written communication system to the electrical industry.

Most common of service calls is the reporting of lights out. The customer calls Cleveland 5260 as instructed in the telephone directory. The first, last and only person

to whom he talks is the young lady in the customers' service telephone department. She assures him that a trouble man will soon be there.

The request goes from the operator to the teletypes. A written order flashes to the service dispatcher and a copy goes into the pending file in the customers' service department. The dispatcher gets in touch by telephone with the trouble shooter in whose district the call is, and it is not unusual for the trouble man to be at the customer's door within five minutes of the time the call was made. Customer reaction in such a case can be imagined.

After eliminating the trouble, the man calls the dispatcher, the dispatcher sends back a completion report on the teletype and the original service request is removed from the pending file. Thus there is a complete record that the customer's request has been carried out. The pending file is reviewed daily to make sure that no request has been forgotten.

Calls to have service moved, discontinued or connected are handled with similar dispatch. In many cases it is possible to get information requested while the customer waits on the line, but when it is a matter of minutes in getting the information, the operator takes the customer's number and calls when the information is available.

Of course the success of the plan is largely a matter of the type of woman who handles customer calls. Operators were carefully chosen for intelligence, patience, good manners and good voice. They were given six weeks of intensive training to familiarize them with the functions of various departments, and the training continues constantly.

Daily the head of the department listens to actual calls on a monitor. He selects calls at random and uses them as a basis for further training of the entire group.

The department operates 24 hours a day every day of the year. Its staff includes fourteen operators and a supervisor. The average number of calls handled per day is 1,200, with peaks in times of general trouble reaching beyond 3,000. Ten operators comprise the usual business day force, and when calls are light spare operators help with filing or typing. Because of their general training, they are valuable extra assistants in practically any department.

While trouble calls and requests to have service moved, started or discontinued form the bulk of business handled by the department, there is a considerable volume of calls regarding bills, asking for information of a general nature and inquiries concerning appliances. There is also a variety of unusual requests which help to make the day's work interesting:

Requests to have cats taken out of trees.

Inquiries regarding the illumination of Niagara Falls.

Questions regarding the frequency change now being made in Buffalo.

Requests for the correct time.

In the year or more that it has been in operation the customers' service telephone department has won a place for itself in the affections of the company's customers. The little journeys by telephone to which they were formerly subjected have been replaced by a simple, direct, pleasant contact with a person who evidently is anxious to help and knows what she is talking about. The customer no longer explains what he wants to two or three different persons, with a resulting rise in his blood pressure. He simply calls a number, states his need, and as far as he is concerned the matter is closed.

The result has been that a large number of people whose contact with the electric company has consisted of a bill each month and an occasional telephone call have materially revised their opinion of the company. The department has certainly been a humanizing influence.

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Energy Consumption by Railroad Shops and Trains

Data pertaining to use of electric power by railroads for other than traction purposes is a significant item in the recent report of the power supply committee of the American Railway Association's electrical section. Fourteen different railroads have 34 railroad repair shops with a total floor area of 10,647,385 sq.ft. These establishments used 112,691,891 kw.-hr. in 1930, an average of 10.6 kw.-hr. per year per square foot. The actual

Customers' service board

values ranged from 3.03 for a relatively large shop to 27.76 for one that was also considerably above average size. Two locomotive manufacturers used 5.83 and 10.86 kw.-hr. per year per square foot, respectively, in their shops. For further comparison, two electric machinery manufacturers used, in 1929, 10.09 and 27.71.

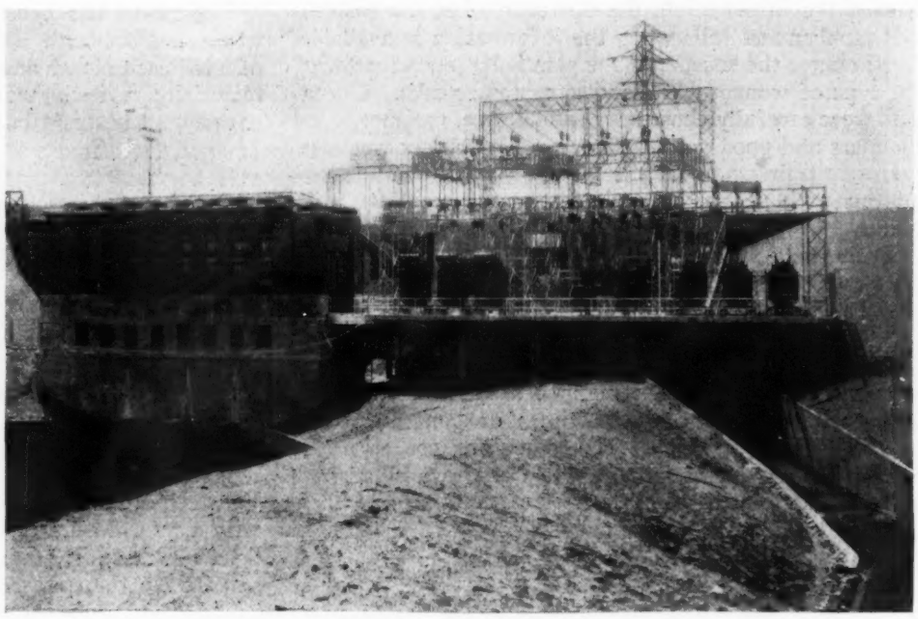
There are also tabulated in the report figures for man-hours in these plants which provide additional indices of spread in power application. The man-hours totaled 87,576,289, thus amounting to 8.23 man-hours per square foot. In this instance the extreme values are 3.27 and 30.56. Still a different index rests in the relation between man-hours and kilowatt-hours. These ratios range from 0.28 kw.-hr. per man-hour to a value of 2.81, the average being 1.29.

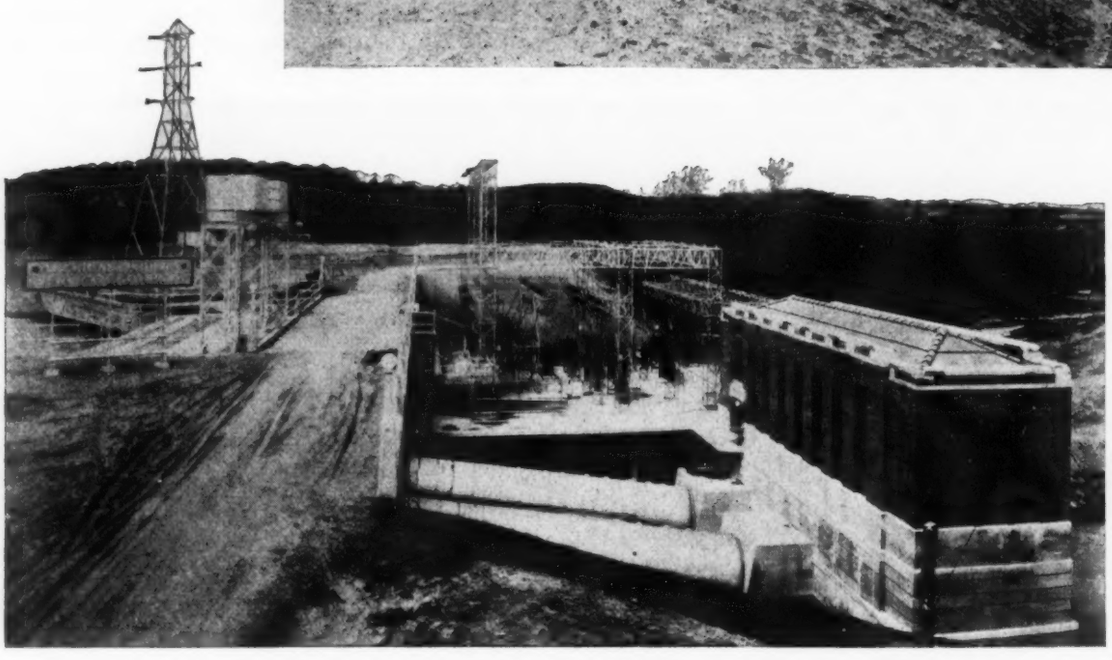
The committee, under the chairmanship of J. H. Davis of the Baltimore & Ohio Railroad, also included statistics about the use by twenty railroads of all electrical energy except that for traction purposes and in a third tabulation, that used on nine railroads for traction. The twenty roads altogether consumed 908,582,198 kw.-hr., which, on 175,457 non-electrical track-miles, means an average of 5,178 kw.-hr. per track-mile. On a route-mile basis the figure is 9,142. The range of route-mile values is from 1,021 to 42,688. Total kilowatt-hours for traction purposes on the 1,457 route-miles electrified 3,548.5 track-miles) amounted to 1,203,-562,188 kw.-hr. One road used as much as 2,568,268 kw.-hr. per route-mile, equivalent to 493,596 per track-mile. The corresponding averages of traction energy values are 825,919 kw.-hr. per route-mile and 339,173 per track-mile of electrified road.

Substation Over Spillway Saves Ground Area

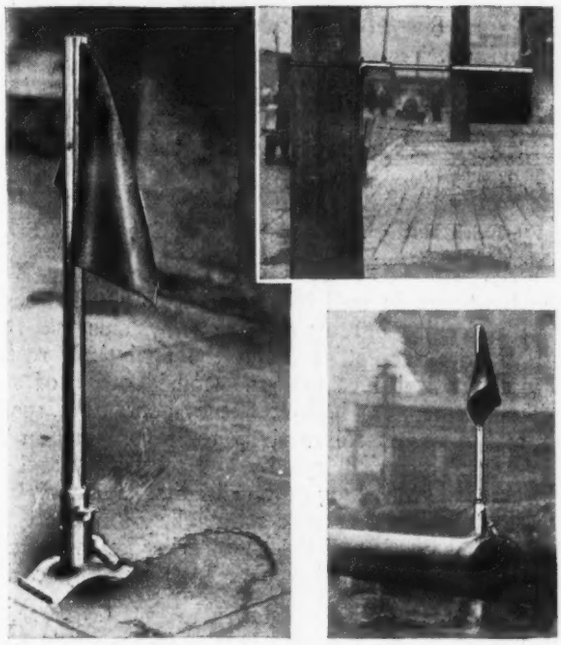
Compactness of arrangement characterizes this recently completed hydro-electric station of the Michigan Public Service Company on the Boardman River. The designer is L. F. Harza.

The experiment of building the substation over the spillway, as shown in the accompanying illustrations, is possible because of the sandy soil that covers a large part of northwestern Michigan. This soil absorbs water so readily that river floods are almost unknown. The spillway has a run-off capacity of 4,000 c.f.s., of which at least half may be considered as safety factor. The station contains two 1,600-hp., 225-r.p.m. Francis turbines, operating at 41 ft. head, furnished by James Leffel & Company, and driving generators of 1,375 kva. at 80 per cent power factor.





Versatile Flagholder



This flagholder, designed by George Herchenrader of the overhead construction department of the Louisville Gas & Electric Company, Louisville, Ky., can be used almost anywhere that there is need for a warning flag. It is heavy enough so that it will support the flag upright on the ground if that is required. The base consists of a tube with a set screw to hold the flag rod, which is welded to a sector piece that is fitted with a holding chain whose fixed end is attached to a compression spring. This spring holds the chain tightly around the pole when the free end of the chain is pulled into the slot on the open side of the sector.

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Corrosion of Parkway Cable

Parkway cable resists the action of most soils fairly well. Results of tests on 32 soils in various parts of the country, extending over a period of six to eight years and constituting one section of a broader research on the effect of soils on non-ferrous metals, are reported in the Bureau of Standards *Journal of Research* for September.

In all but three instances the inner fabric was found to be good and in the majority the outer fabric was at least fair. The outer steel wrapper, while more or less rusted in the majority of pieces, was pitted in only two and in 21 it was not worse than slightly rusted. In ten of these the condition was reported as good.

The inner steel wrapper was distinctly better. It is given as "rusted," "bad" or "badly rusted" in six instances, "good" in nineteen. In only one test was the lead sheath pitted. The report adds this comment:

"It seems probable that the use of a wrapper which would not separate on being bent and one more thoroughly impregnated with bituminous material would offer more protection to the steel wrappers, but the condition of the lead sheath indicates that the present construction results in quite effective protection of the copper conductor, which is really the objective sought."

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READERS' FORUM

Forbearance in Honors

To the Editor of the ELECTRICAL WORLD:

An item in the ELECTRICAL WORLD of September 19, 1931, reports a meeting of the American Physical Society at which tributes to Faraday and Henry were paid. It would be interesting to have some one explain in what way Faraday was honored.

The papers presented were prompted presumably by the occasion of the celebration of Faraday's anniversary in England. If a tribute to Faraday were intended, what purpose was served by emphasizing the fact that Henry experimented along similar lines. One wonders whether the spirit displayed by Gar Wood likewise actuates the scientist of the United States and makes him incapable of allowing even posthumous honors to be conferred unreservedly in that country on any other than a citizen of the United States.

The discovery of the property of an electric circuit known as inductance is generally conceded to Faraday, yet the unit of inductance bears Henry's name in full. A contraction only of Faraday's name designates another electrical unit. Is that not sufficient for the scientist of the United States or does he think that Henry needs a little more glory reflected from the man with whose work Henry's ran "curiously parallel," to quote Prof. W. G. Magie's reported words.

A similar instance is the persistent claim of Kennelly in connection with the Heaviside layer until in the United States publications one continually encounters the term Kennelly Heaviside layer. Does Kennelly need the prop of Heaviside's name to perpetuate his own? Couldn't he let him have even posthumous honor? The poor old man got little enough in his lifetime.

The argument is about as fruitless as the one of "who won the war," but in the interests of broader knowledge we read each others' publications, and it is annoying, to say the least, continually to encounter such an attitude. Proximity, if nothing else, makes desirable a maximum of harmony between the United States and Canada. You are at liberty to think what you wish, but please bear in mind that we likewise have our thoughts and common sense indicates that the best interests of harmony are not served by saying everything one thinks. On the contrary, harmony is often promoted by a little thought of the other fellow's viewpoint and a little whole-souled self-effacement at times on the part of one who can well afford it. It gives the other fellow a very healthy glow which reacts strongly and favorably.

Toronto, Canada. **R. G. MATTHEWS.**

BOOK REVIEWS

A Text Book of Physics

By Louis Bevier Spinney. Macmillan Company. 679 pages. Price, $3.75.

The original intention of the author of this college text was to keep the treatment close to familiar phenomena and heighten interest in certain drab phases of the subject by special effort to make them appealing. The fourth edition has extended this intention in the field of mechanics and calorimetry. It is a modern elementary physics text, not unbalanced by injection of a preponderance of the last two decades' advances.

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Commerce Yearbook, 1931, Volume 1—United States

Published by the Government Printing Office, Washington, D. C. 696 pages. Price, $1.

Like its predecessors, this number of the Yearbook contains a summary of the latest statistical information collected by numerous government bureaus, trade associations and trade journals, relating to various branches of commerce and industry. In many instances these statistics are carried through the year 1930. This has evidently been done wherever the information was available. To the electrical industry, whether in the field of manufacture, distribution, or light and power, the compilation provides data for an analysis of relationships (economic and other) with other activities.

•

Radio Frequency Electrical Measurements

By H. A. Brown. McGraw-Hill Book Company, Inc., New York. 386 pages, illustrated. Price, $4.

Theory and principles of radio-frequency measurements are stated and then applied to laboratory measurement work. Capacitance, inductance, resistance, frequency are fundamental radio-frequency measurements discussed. In addition the author treats of antenna measurements, wave form, coefficient of tubes, transmitters, receiver and piezo effects. This is a well-rounded text on a new and rapidly changing aspect of electrical measurement.

•

Statistik der Elektrizitätswerke Rumäniens, 1930

Published by the Vereinigung der Elektrizitätswerke. 136 pages. Hermannstadt-Sibiu, Rumania.

Localities served with electric power, to the number of 282, are listed, with voltage, type of current and frequency. Detailed data for the year 1929 to the extent of 82 items are given on each of 155 establishments. Most of these relate solely to physical plant and operations. The exceptions are energy rates and value of plant and equipment; unfortunately the latter item is omitted for some of the largest concerns. In addition 33 industrial plants are tabulated and nine electric railways. Provision is commendably made for the convenience of foreign readers. The column headings are in five languages—Rumanian, German, Hungarian, French and English. A supplementary map of generous size shows lines from 110,000 down to 3,000 volts—present, under construction and projected.

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Hochfrequenztelephonie und -telegraphie auf Leitungen

By Dr. Erich Habann. Friedr. Vieweg & Sohn A.-G., Braunschweig (Germany). 167 pages, 143 illustrations. Price, 17.50 reichsmarks.

The treatment is well balanced between the descriptive, with circuit diagrams of various systems that have found practical acceptance, and the analytical, resting on a mathematical development. Consideration of such individual elements as high-frequency generators, modulators and filters is followed by their combination for multiple carrier-wave telephony and telegraphy and for speech transmission along power circuits. In the field of power engineering the book should be of interest primarily to that portion of the engineering personnel concerned with communication over high lines by carrier currents.

•

Lead

By Lead Industries Association, Graybar Building, 420 Lexington Avenue. 104 pages.

This little book deals with the extraction, purification, properties and proportions of metallic lead for uses in all its fields of applicability, as well as the uses of its chemical compounds, and engineers will find many elements of specific value in it. Composition of battery plates, lead cable sheaths, condenser foils, fuses, fusible alloys, solders, etc., are given for the benefit of the electrical engineer. The structural engineer and builder will likewise find data about paints, roofs, plumbing, etc.

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Economics for Engineers

By E. L. Bowers and R. H. Rowntree. McGraw-Hill Book Company, Inc., New York. 490 pages, illustrated. Price, $4.

This is a text for engineers whereby what might be called theoretical economics is adapted to more definite and practical aspects found in business and engineering. Principles are selected and applied carefully to examples and the scope of the work pertains to manufacturing in its marketing and cost accounting aspects very largely. The book is well written and well illustrated.

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Soviet Foreign Trade Menace or Promise

By J. M. Budish and Samuel S. Shipman. Horace Liveright, Inc., New York, 1931.

This study is sponsored by the economic division of the Amtorg Trading Corporation. It is concerned chiefly with the trade between the United States and Soviet Russia and it touches upon basic economic conditions in Russia growing out of the Five-Year Plan.

Men of the Industry

W. M. VAUGHT, manager of the Elizabethton division of the East Tennessee Light & Power Company, has been elected president of the Chamber of Commerce of that city by the board of directors of that body.

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H. W. KILKENNY, St. Louis branch office manager of the Ohio Brass Company, has resigned. Mr. Kilkenny, who has been actively identified with the electrical industry since 1907, is financially interested in his brother's company, the J. G. Kilkenny Company, manufacturers' agents, of Cleveland, Ohio.

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E. F. WATKINS has been appointed manager of purchases and stores, Southern California Edison Company, Ltd., by R. H. Ballard, president. The title of purchasing agent, formerly held by Mr. Watkins, has been abolished. Mr. Watkins for a number of years has been head of the Edison company's purchasing department and in his new position the scope of his work will be broadened. He is a member of the Purchasing Agents' Association of Los Angeles and last year was president of the Los Angeles Electric Club.

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EDGAR J. KATES, secretary of the oil and gas power division of the American Society of Mechanical Engineers, has been made the recipient of the Randolph Diesel award for 1931 for his paper entitled "Dispersion of Sprays in Solid Injection Oil Engines," presented at the national meeting of the oil and gas power division, A.S.M.E., held last June at the University of Wisconsin. Presentation of the certificate of the award, together with the accompanying prize of $100 donated by the Diesel Engine Manufacturers' Association, will be made at the annual meeting of the American Society of Mechanical Engineers in December.

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PERRY S. PAINTER, assistant general counsel of the Missouri State Public Service Commission, has resigned to join the legal staff of the United States Department of Agriculture at Washington, D. C. Mr. Painter, formerly of Milan, Mo., removed to Jefferson City in 1921 to become private secretary to Arthur M. Hyde, then Governor of Missouri and now Secretary of Agriculture in President Hoover's Cabinet. Later he served as a member of the State Public Service Commission and also as chief counsel before becoming assistant general counsel of the commission. At Washington he will be counselor for the solicitors of the Department of Agriculture.

▼

W. N. Clark New President of Colorado Utility

W. N. CLARK, vice-president and general manager of the Southern Colorado Power Company since 1924, has been elected president of that utility. The office of president has been held by Mr. O'Brien, who as president of Byllesby Engineering & Management Corporation and Standard Gas & Electric Company, has served also as president of most of the subsidiary and affiliated companies comprising the Standard Gas & Electric Company system. Announcement also is made of the election of E. F. Stone as vice-president in charge of sales, M. G. Lord vice-president in charge of operation and W. J. Benning vice-president and treasurer.

Commenting on the action of the board, Mr. O'Brien said: "The election of Mr. Clark as president of Southern Colorado Power Company is very gratifying to me. He has earned this recognition through his many years of public service in the utility industry. He has been with the Byllesby organization since 1911 and was instrumental in the consolidation of various small organizations in southern Colorado into one strong and efficient company."

Mr. Clark was graduated from the University of Illinois and from the Colorado School of Mines with a degree of electrical engineer. After working a short time with the telephone company and the old Denver Gas & Electric Company, he entered the mining districts of Colorado and participated in the earliest development of three-phase transmission of power from hydro-electric plants for mining service in the San Juan district. From there he entered the Cripple Creek district, installing an underground mine trolley haulage system at the Gold Coin mine and the interurban railway in that district, together with the electrification of the gold mines, including mine pumping at great depths. Mr. Clark was instrumental in consolidating the four leading electric companies in the Cripple Creek mining district into one organization. He joined the Byllesby organization in 1911.

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DR. H. FOSTER BAIN has resigned as secretary of the American Institute of Mining and Metallurgical Engineers to become affiliated with the Copper and Brass Research Association, New York.

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FRANK L. BLANCHARD, director of the advertising and news department of the Cities Service Company, was made a member of the advisory board of the Financial Advertisers' Association at a recent convention held in Boston. Mr. Blanchard is widely known in the advertising field, which he entered after engaging in newspaper work. He served as managing editor of *Printers' Ink* before affiliating himself with the Doherty organization in 1922, and since that time Mr. Blanchard has been active in all branches of public utility advertising work.

•

CHARLES E. INGERSOLL, the oldest director in point of service, resigned from the directorate of the Philadelphia Electric Company at the meeting of the board of directors held October 28. Mr. Ingersoll was elected a director of the company in the spring of 1904 and has served continuously since that time. The vacancy was not filled. He also resigned as a member of the boards of the Susquehanna Electric Company, Susquehanna Power Company and Philadelphia Electric Power Company, subsidiaries of the Philadelphia Electric Company. These places were filled by the election of Samuel T. Bodine, chairman of the board of the United Gas Improvement Company. Until recently Mr. Ingersoll had been one of the

most active directors of the company. Devoting most of his active life to large financial and business matters, he obtained wide experience and his advice was frequently sought on knotty problems. Mr. Ingersoll is a director of the Pennsylvania Railroad, Girard Trust Company, Central-Penn National Bank and the Philadelphia & Western Railroad Company. He is president of the Muskogee Company, Midland Valley Railroad Company, Kansas, Oklahoma & Gulf Company, Oklahoma City-Ada-Atoka Railroad Company and the North Pennsylvania Railroad Company.

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Lincoln and Caddigan of Boston Promoted

RICHARD LINCOLN has been appointed superintendent and J. J. CADDIGAN assistant superintendent of the newly formed merchandising department of the Edison Electric Illuminating Company of Boston. Under the arrangement the appliance, suburban district managers and a part of the promotion department work will be grouped together in the commercial division of the operating bureau.

Mr. Lincoln has been associated with the company since 1909, when he entered the collection department. He was transferred to the sales department in 1916 and for three years was in charge of merchandise sales in the Framingham district. Three years later he assumed the duties of assistant superintendent of the appliance department and three years ago he was promoted to the position of superintendent.

Mr. Lincoln has built up the merchandising activities of the Boston com-

pany with notable success. In addition, for many years he has taken an active part in the National Electric Light Association's work.

Mr. Caddigan has been with the company since 1903, and for several years has specialized in relations with allied interests. Since its organization he has been treasurer of the Metropolitan Electrical League of Boston, was recently elected president of the National Electrical League Council and is a member of the executive committee and board of directors of the Society for Electrical Development, Inc.

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OBITUARY

Lewis T. Robinson

LEWIS T. ROBINSON, engineer in charge of the general engineering laboratory of the General Electric Company, died

suddenly November 3. Mr. Robinson had been an outstanding figure in the electrical industry for a number of years, chiefly by reason of his championing the cause of standardization of electrical machinery.

Born in Springfield, Mass., in 1869, Mr. Robinson was educated at Reading and Lynn and then started his career in the electrical industry by taking charge of the standardizing laboratory of the Thomson-Houston Electric Company. In 1891 he became a member of the testing firm of Whitmore & Robinson and in 1896 took charge of the standardizing laboratory of the General Electric Company. Later he was promoted to his present position as engineer in charge of the general engineering laboratory. Under his direction important work was accomplished by this laboratory in connection with the maintenance of proper electrical standards, testing and investigating devices and machines and Mr. Robinson contributed personally to the development of instruments and testing methods, notably the oscillograph and the determination of magnetic properties of iron and steel.

Mr. Robinson devoted himself unselfishly to association work, having held important offices in several representative organizations. He was a fellow of the American Institute of Electrical Engineers, was a manager of that organization for three years (1913-1916), served as chairman of the standards committee (1918-1920), and as a vice-president from 1916-1918 and from 1920-1921. He was also a fellow of the American Physical Society and a member of the United States National Committee of the International Electrotechnical Commission, the Society for the Promotion of Engineering Education, American Engineering Council and the American Standards Association. Mr. Robinson had to his credit patents covering a wide variety of electrical instruments and devices and was the author of numerous papers read before engineering societies.

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ETHRAIM S. HAMBLEN, a widely known power company executive in the New England field, died suddenly, at his home in Newtonville, Mass., November 2. Mr. Hamblen attended the Brooklyn Polytechnic Institute, and later entered the electrical department of the Newton & Watertown (Mass.) Gas Light Company. When this property was acquired by the Edison Electric Illuminating Company of Boston Mr. Hamblen remained with the organization for two years, leaving to become chief electrician of the Weymouth (Mass.) Light & Power Company. He held this post for two years and then served for three years as manager of the Randolph & Holbrook Power & Electric Company. In 1916 he became manager of the Union Electric Light & Power Company, Franklin, Mass., and in 1925 became manager for the affiliated C. D. Parker & Company interests of the Central Massachusetts Electric Company, Palmer, with territorial supervision of the Ware Electric Company, Southern Berkshire Power & Electric Company, and Winchendon Electric Light Company. He resigned in 1929 shortly before the Parker properties were taken over for management by the New England Power Association. Mr. Hamblen was a past-chairman of the Commercial Section, New England Division, of the National Electric Light Association, and had an unusual record as a builder of public relations, a far-sighted commercial leader and executive of balanced engineering judgment.

Financial and Statistical News

EVIDENCES, still rather intangible, of business and industrial improvement are not immediately reflected in utility earnings throughout the country as a whole. Many current utility reports, however, from New England and elsewhere reflect improvement actually under way in substantially increased earnings.

——STOCK MARKET STABILITY IN FACE OF ADVERSE NEWS is more marked during the last week or two. Prices appear to have become more or less shockproof, while at the same time less responsive to favorable news. Utility common stock averages gained a few points during October, but have remained virtually unchanged during the past two weeks.

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September Revenue Off One Per Cent

RETURNS FROM ELECTRIC light and power companies indicate that the gross revenue of the industry in September was $172,860,000, compared with $174,940,000 a year ago, a reduction of about 1.2 per cent. In view of the fact that the revenue in 1930 was 0.8 per cent greater than in the preceding year this brings the current figure only slightly below 1929 and well above that of any earlier year. Late returns may necessitate a slight revision, which is likely to be upward rather than downward.

Improved conditions, relative to 1930, are again evident in New England, in the West North Central States and on the Pacific Coast. Other regions are approximately at last year's level except the central industrial region, the Southwest and the Mountain States, all of which reflect the continuation of unsatisfactory conditions in the dominant local industries.

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Electric Power & Light Offers Common Stock

ONLY ONE CAPITAL FLOTATION was announced by the utilities for public sale in October—an issue of 1,440,400 common shares of Electric Power & Light Corporation. Offered at $15 a share to holders of common stock and option warrants of record November 10, this should net about $21,000,000 by December 4.

The purpose of this financing is to help pay the balance of $24,000,000 on the $30,000,000 subscription which Electric Power & Light Corporation made for second preferred stock units of its subsidiary, United Gas Corporation.

It is understood that Electric Bond & Share Company, owner of about one-third of the common stock and over half of the outstanding warrants of Electric Power & Light Corporation, has agreed to subscribe at $15 for its proportion, about 567,800 shares. Electric Bond & Share Company is stated to have further agreed to underwrite the remaining 872,600 shares at $15 for a commission of 50 cents per share.

The privilege of subscribing for the new common stock of Electric Power & Light Corporation is to be offered ratably to holders of record at the close of business on November 10, 1931, and is to be at the rate of 13/23 of one new share of common stock (a) for each one share of common, including whole shares of the common stock covered by any outstanding preferred stock allotment certificate of the company if no default exists thereunder on November 10, 1931, and (b) for each option warrant. The subscription price will be payable in cash or in New York funds at the office of Electric Power & Light Corporation, December 4.

Warrants for whole shares, which will evidence the rights to subscribe for common stock, and fractional warrants, which will not alone evidence any right to subscribe but will evidence the rights of the holders thereof to subscribe for common stock upon surrender of such fractional warrants in integral amounts, will be mailed to such holders of record at the close of business November 10, 1931, to reach the holders entitled thereto as soon as possible after that date. The warrants for whole shares will be issued in the names of the security holders of record on said date and will be transferable on the books of the company. The warrants for fractional shares will be issued in bearer form and will be transferable by delivery.

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Utility Public Financing Comes to Full Stop

AFTER a gradual slowing down process, commencing in April and increasing steadily in velocity, the capital-securing machinery of the utilities came to a full stop in October. New capital secured from the public during the month was zero. A common stock issue was announced the last of the month. There is only one precedent for such a situation in recent years and that was November, 1929. Sales of preferred stock to customers continues—in fact, is accelerated.

With prices of seasoned bonds where they are it is not surprising that there is no market for new issues, at least anywhere near prices at which they would normally sell. Further than this the rank and file investor hesitates about buying anything or is tempted by what appear to be bargains in stocks.

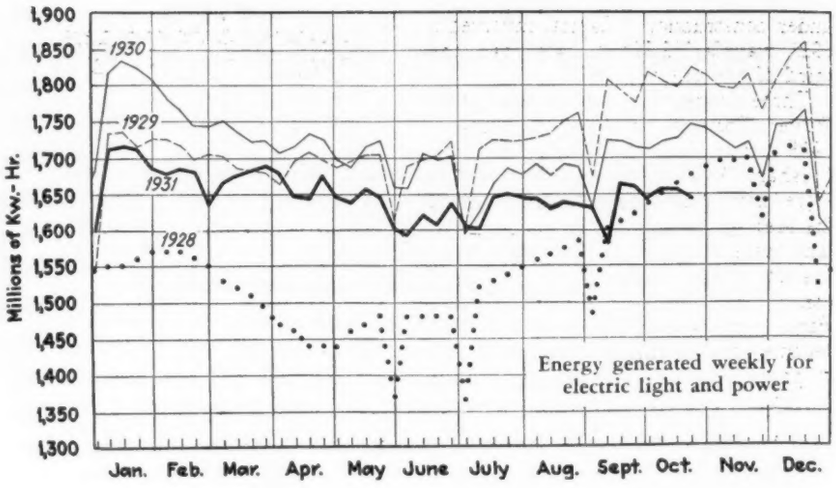
This does not mean that utilities in general are crippled for lack of capital. For the first nine months of the year securities sold publicly totaled about $1,140,000,000, against a total for the same period last year of $1,120,000,000. It does mean, though, that the companies will be somewhat restricted in shaping plans for additions to plant and equipment.

Customer sales increase

While totals for sales of preferred stock to customers are not yet available, campaigns have been unusually active this year to date. Public Service Company of New Jersey, for example, had a three-day campaign the first of October and sold about 27,000 shares of $5 cumulative preferred stock. Five companies in the National Electric Power group have recently opened campaigns and six more will start early this month. Jersey Central Power & Light and Public Service Company of New Hampshire have already completed successful campaigns. The last-named company

undertook a quota of 3,500 shares and sold over 5,660 shares in about two weeks. Other Middle West utility companies have also had campaigns. Employee stock-selling campaigns are being carried on.

Customer-ownership campaigns thus have been speeded up as resistance to public issues has increased. Customer sales have proved an exceedingly important stabilizing factor as is shown by conditions since the beginning of the present depression. Currently they amount to about 10 per cent of all financing, although over a ten-year period 15 per cent of all capital secured has come from customers.



Average Rate 5.91 Cents; Use 566 Kw.-Hr.

CONTINUOUSLY DECREASING DOMESTIC RATES, a gain in the number of domestic customers and rising energy consumption are revealed in a summary published by the National Electric Light Association, which gives statistics for the industry as of the end of last July. The average domestic rate for the country as a whole is now less than 6 cents per kilowatt-hour, and despite adverse economic conditions the number of domestic customers increased by more than 200,000 during the twelve-month period. Comparative data follow:

	Year Ended July 31 1931	1930
Number of new customers added:		
Domestic	208,553	699,107
Commercial—Small light and power	6,465	73,978
Commercial—Large light and power	13,339	43,727
Other consumers	3,288	11,592
Total customers added	218,715	828,404
Domestic service (residential use):		
Average annual kw.-hr. per customer	566	530
Average revenue, cents per kw.-hr.	5.91	6.16
Average monthly bill	$2.79	$2.72

The same report also gives data showing how the remarkable increase in total residential sales, exceeding 23 per cent in two years, and smaller gains in some other fields have eased the effect of reduced sales for industrial power. A comparison of sales to ultimate consumers, for the first seven months of three consecutive years, appears in the accompanying table.

According to the same authority the total revenue from ultimate consumers for the seven months was 0.7 per cent less in 1931 than in 1930, but 4.2 per cent more than in 1929.

Power Plants in India

INDIA HAS A TOTAL of 603,128 kw., installed in 94 plants, according to special circular No. 575 issued by the Electrical Equipment Division, Bureau of Foreign and Domestic Commerce, Washington, D. C.

Of the total number rated, 47 have a capacity of 1,000 kw. or over, totaling 585,961 kw., 43 aggregating 16,882 kw. lie between 100 and 1,000 kw.; the remaining four have only 305 kw. Twelve places have bulk supply, generating no energy of their own. For fourteen others no rating is given.

The largest in the country, at Bombay, is rated at 87,500 kw. Calcutta rates second at 72,500 kw., Jamshedpur third at 55,000 kw.

According to the bulletin, 30 of these plants are steam, 27 hydro-electric, fourteen Diesel, nine oil, seven have more than one kind of prime mover and the others are not classified. Some d.c. distribution exists, but 50-cycle, three-phase, 230/400-volt operation predominates; 230/460, 250/500, 110/200 and other voltages are given.

The bulletin also lists thirteen plants in Burma—four exceeding 1,000 kw., with 25,355 kw. together.

Output Lags Behind 1930

RECENT WEEKS have brought a somewhat slower increase in energy of light and power plants than the corresponding periods of 1929 and 1930. Coming after a time when the output was already smaller than in the two preceding years, this lag has increased the disparity, though by an amount that is not large and that may quite possibly be due to differences in weather conditions in the several years.

In September the average was about 3.8 per cent lower than in 1930; during the last three weeks it was successively 4.2, 5.8 and 5.1 per cent.

The output for recent weeks, as reported by the National Electric Light Association, with comparable data for other years, all expressed in millions of kilowatt-hours, was as follows:

	1931	1930	1929	1928
September 26	1,660	1,714	1,778	1,673
October 3	1,646	1,711	1,819	1,637
October 10	1,653	1,724	1,806	1,651
October 17	1,656	1,729	1,790	1,665
October 24	1,647	1,747	1,824	1,678
October 31	1,652	1,741	1,816	1,688

Sixfold Gain in Six Years in Nova Scotia

SEVEN ELECTRIC POWER distribution systems are now in operation by the Nova Scotia Power Commission, with a capital investment of approximately $13,500,000. According to a recent statement of the commission reviewing hydro power progress, the output in the year ended September 30, 1931, was six times as large as in 1925, having increased from 25,458,067 kw.-hr. to 151,650,000 kw.-hr. During the same period turbine capacity increased from 22,580 hp. to 62,875 hp., while the transmission and distribution lines have grown from 94 miles to 226 miles and an additional 55 miles of line is now

Changes in Energy Sales, First Seven Months, 1929-1931

Class of Service	Millions of Kw.-Hr. 1931	1930	1929	Per Cent Increase, 1931 Over 1930	1929
Domestic	6,866	6,378	5,572	+7.7	+23.2
Commercial retail	8,111	7,994	7,419	+1.5	+9.3
Commercial wholesale	22,502	24,821	25,187	—9.3	—10.7
Municipal street lighting	1,295	1,223	1,117	+5.9	+16.0
Electric railways	2,764	2,864	2,971	—3.5	—7.0
Electrified steam roads	354	341	354	+3.5	—0.1
Municipal and miscellaneous	266	281	232	—5.3	+14.6
Total to ultimate consumers	42,158	43,902	42,852	—4.0	—1.6

under construction. Capital involved in 1925 was $4,302,896 or less than one-third of the present figure.

Three systems of the Nova Scotia Power Commission were operating in 1925, known as St. Margaret's Bay, Mushamush, and Sheet Harbour. Four more have since been added, namely, the Mersey, Tusket, Roseway and Markland systems. One of these, the Mersey system, followed the execution of a contract to supply power to the Mersey Paper Company at Brooklyn. It has become the commission's largest source of power with three hydro plants built to supply the demand, these containing a total installation of 29,400 hp.

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Utility Taxes Increase in 1930

TAXES PAID BY electric light and power companies in 1930 amounted to $16,000,000, an increase of 8.5 per cent over the amount paid in 1929, according to a compilation made by the National Electric Light Association. The figures show that 10.2 cents out of every dollar of revenue from sales to consumers went for taxes in 1930.

In the 29 years from 1902 to 1930, inclusive, the taxes paid per dollar of gross revenue by the industry were trebled. In 1902 total taxes were $2,654,885, or 3.4 cents for every dollar of revenue; in 1912 the taxes were $13,117,198 or 5.2 cents out of every dollar; in 1922 taxes were $73,128,440, or 8.4 cents out of every dollar, and, in 1929 taxes were $187,500,000, or 9.7 cents out of every dollar of revenue.

Montreal Stockholders Offered Optional Plan

STOCKHOLDERS OF Montreal Light, Heat & Power Consolidated at a meeting held on November 4 voted the approval of a plan whereby customers who have been purchasing capital stock of the company on the installment plan at $50 a share may have the option of taking in place of stock when the payments are completed next July a fifty-dollar, seven-year, 3 per cent convertible debenture bond, ranking ahead of the common stock and second only to the company's outstanding bonds. The debentures may be converted at any time up to July, 1937, into common stock, and thereafter subject to redemption by the company at any interest date at $50 plus interest.

The following statement was issued by J. S. Norris, vice-president and managing director:

When we offered shares to our customers for subscription a year ago, at a price considerably under the prevailing level on what was then considered a depressed market, no one imagined that in the course of the following year stock market prices would decline to such an additional extent as they have. Due to unprecedented and uncontrollable events, prices of all commodities, real estate and securities generally, including even municipal and government bonds and currencies, have suffered regardless of value—and market quotations for our shares have been similarly affected for the time being.

In spite of the world-wide depression, the company is actually in a better position today with respect to gross and net earnings finances, properties and prospects than at any time in its history. We still firmly maintain and reiterate the statement made at the time, that "These shares are a safe and sound investment with good possibilities for enhancement in value if you believe, as we do, that our company must continue to grow and prosper as the city and district of Montreal continues to grow and prosper. So convinced are we of the inherent soundness and eventual vindication of this policy that, subject to the approval of the shareholders, we propose to offer subscribers the following option to implement our confidence and remove any anxiety which they may have as to their investment."

Details of the plan followed.

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Utility to Replace Old Notes with New

ACCORDING TO A LETTER sent to the noteholders, American Community Power Company was unable to pay its issue of $1,800,000 notes, 5½ per cent issue, which matured during the past week. The company offered to holders of the maturing issue a like amount of new notes due November 1, 1933, carrying a 6½ per cent coupon.

The letter to the noteholders says earnings of the company have been sufficient to cover all interest, maintenance and depreciation charges and to pay dividends. The new notes will be secured by a deposit and pledge of first mortgage and collateral 6½ per cent bonds, series A, of the General Public Utility Company in an aggregate principal amount equal to 125 per cent of the amount of new notes issued.

Each $1,000 of the new notes will be convertible at the option of the holder into $1,200 principal amount of the pledged collateral and $50 in cash.

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CURRENT EARNINGS REPORTS OF ELECTRIC LIGHT AND POWER COMPANIES

Operating Companies

	1931	1930	Per Cent Increase	Operating Ratio 1931	Operating Ratio 1930
Alabama Power (Year ended September 30)					
Gross earnings	$17,940,844	$17,972,897	— 0.1	41	42
Net earnings	10,287,579	10,385,193	— 0.9	..	..
Consumers Power (Year ended September 30)					
Gross earnings	31,191,515	32,819,321	— 4.9	43	46
Net earnings	17,853,585	17,601,947	1.4	..	..
Georgia Power* (Year ended September 30)					
Gross earnings	25,455,301	26,438,270	— 3.7	50	50
Net earnings	12,950,008	13,432,510	— 3.6	..	..
Kansas City Power & Light (Year ended September 30)					
Gross earnings	14,844,048	14,759,574	0.5	45	50
Net earnings	8,140,701	7,460,652	9.1	..	..
Philadelphia Electric† (9 mos. ended September 30)					
Gross earnings	49,114,225	48,386,398	1.5	54	54
Net earnings	22,627,955	22,284,713	1.5	..	..
Southern California Edison (Year ended September 30)					
Gross earnings	41,018,463	41,172,721	— 0.3	33	33
Net earnings	27,615,978	27,590,238	0.0	..	..
Tennessee Electric Power (Year ended September 30)					
Gross earnings	13,892,432	15,226,356	— 8.7	50	52
Net earnings	6,946,517	7,352,990	— 5.5	..	..

Holding Companies

	1931	1930	Per Cent Increase	Operating Ratio 1931	Operating Ratio 1930
Commonwealth & Southern & subs. (Year ended September 30)					
Gross earnings	$133,120,541	$144,206,405	— 7.5	47	50
Net earnings	70,456,789	73,517,838	— 4.2	..	..
Eastern Utilities Associates & constituent cos. (Year ended September 30)					
Gross earnings	9,272,837	9,293,958	— 0.2	58	60
Net earnings	3,896,943	3,764,985	3.5	..	..
Engineers Public Service & constituent cos.† (Year ended September 30)					
Gross earnings	52,098,666	52,792,509	— 1.3	55	57
Net earnings	22,689,327	22,447,518	1.7	..	..
Nevada-California Electric & subs. (Year ended September 30)					
Gross earnings	5,760,318	5,638,722	2.2	48	48
Net earnings	3,004,392	2,902,023	3.5	..	..
North American & subs.‡ (Year ended September 30)					
Gross earnings	120,684,598	140,296,108	—14.0	53	52
Net earnings	56,284,219	67,456,075	—16.6	..	..
United Gas Improvement & subs. (Year ended September 30)					
Gross earnings	106,617,034	108,150,218	— 1.4	57	58
Net earnings	46,007,277	45,036,080	2.1	..	..

*Columbus Electric & Power included.
† Operating expenses include depreciation.
‡ Excludes gross earnings, operating expenses and all other details of income accounts of former California subsidiaries for 12 mos. ended September 30, 1931, and for 3 mos. and 18 days ended September 30, 1930.

Business News and Markets

General Electric Employees Accept Unemployment Plan

BY A SWEEPING MAJORITY, the new unemployment relief plan offered to employees of the General Electric Company has been accepted by them, President Gerard Swope announced October 28 when a tabulation of the votes showed that 89.5 per cent of those employees eligible to vote had cast their ballots and that 97 per cent of these ballots favored adoption of the plan.

The plan provides for rotation of available work and other means by which hourly rated and piecework employees on the payroll November 1 may be assured of receiving, during the following six months, not less than the equivalent of one-half of their average full-time weekly earnings up to an average of $15 per week, and their actual earnings in case the latter amount to more than $15 per week.

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Uniform Accounting Helps Electrical Manufacturers

BENEFITS OF UNIFORM ACCOUNTING to the electrical manufacturing industry are thus summarized by T. W. Howard, director of uniform accounting for the National Electrical Manufacturers' Association:

"Competition between members of the industry will be conducted on an intelligent basis when each of the competing companies has accurate data on its own costs of manufacture and distribution, which are based upon the uniform accounting procedure. Price quotations on products made to customers' specifications may be based on reliable and comparable cost data. The customers of the industry will have increased confidence in the industry through the resulting stabilization in price quotations.

"Even in the case of standard products on which prices are regulated by economic forces rather than by each manufacturer on the basis of his individual costs there will be benefit to the industry. Under these conditions obviously no manufacturer will continue long to offer such a standard product at a price which fails to yield a reasonable profit to him.

"The industry will be at an advantage when accounting data are required by governmental bodies. For example, the United States Tariff Commission may require facts on the costs of production of a particular product. Exhibits of facts submitted by the industry on the matter of tariffs will be strengthened when the cost data are based upon uniform accounting procedure."

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Allis-Chalmers' Profits Down 60 Per Cent

THE REPORT OF the Allis-Chalmers Manufacturing Company for the nine months of 1931 shows a net profit, after all charges including federal taxes, of $1,212,773, equivalent to 95 cents per share. This compares with $3,034,522 for the corresponding nine months of 1930, or $2.41 per share. For the September quarter the net was $206,712, compared with $682,982 for like period a year ago.

Bookings for the current nine months amounted to $18,664,756, contrasted with $36,348,300 in the 1930 period. Unfilled orders September 30, 1931, aggregated $7,915,088, as against $13,002,923 at the close of 1930, but showed an increase in October.

Swope Defends Plan for Industrial Co-ordination

DEFENCE OF VARIOUS PHASES of his plan for industrial co-ordination through trade associations was presented by Gerard Swope, president of the General Electric Company, while appearing as a witness before the special senatorial committee of which Senator La Follette of Wisconsin is chairman. Mr. Swope defended his plan as an alternative to the creation of a national economic council, a plan proposed by Senator La Follette. Mr. Swope said in part:

I am in entire sympathy with having a national economic council, but I need hardly call to the attention of the committee that this would be creating a new organization in the government when already there are several dealing with the subject-matter of the bill in the various departments.

Trade associations in America are the natural organizations to study the economic elements of each particular industry. Each trade association should hold itself responsible for the co-ordination of production and consumption to stabilize its industry, with the consequent benefits to the employees and to society. The organization and furtherance of the work of trade associations should be encouraged.

The trade associations, working out their

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Vacuum Oil-Treating Tanks for Transformers

AN OIL BATH in vacuum tanks is given the cores and windings of transformers in the Pittsburgh plant of the General Electric Company. Air and moisture are first removed from the assembled cores and windings in the tanks by vacuum pumps. When they are dry, transformer oil is pumped into the treating tank under sufficient pressure to saturate thoroughly all parts of the transformer, which is then removed and placed under oil in its own tank.

problems in the stabilization of industry, would then be the foundation stones upon which to erect the superstructure of the national economic council. This might then be created by bringing together the officers or duly elected representatives of these various trade associations, to select from their number or outside a national economic council to study the needs of industry as a whole.

Such a council would consist of men who have come up through the various industries, know those industries and their needs, who would work with others to find a solution to their common problems and be able to deal with them, not only more intelligently, but in a more practical and expeditious manner, so that definite, concrete and constructive results might be expected.

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Price of Copper Continues Firm

	Oct. 28, 1931 Cents per Pound	Nov. 4, 1931 Cents per Pound
Copper, electrolytic	7	7
Lead, Am. S. & R. price	4	3.85
Antimony	6.50	6.50
Nickel, ingot	35	35
Zinc, spots	3.58	3.50
Tin, Straits	23	22.25

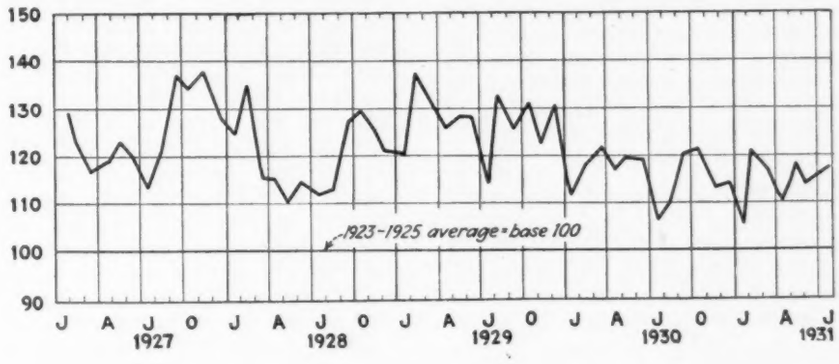
Southern Industry Shows Stability

MANUFACTURING activity has fluctuated within much narrower limits, on the whole, during the past four years in the South than in other sections of the country. That conclusion follows from a comparison of index numbers as given on this page with corresponding numbers previously published in the ELECTRICAL WORLD for other regions: New England, September 5, page 437; the Middle Atlantic States, September 19, page 525; the North Central States, October 10, page 669.

In all cases the computed activity is based on monthly reports of electrical energy consumption in more than 3,500 manufacturing establishments, grouped by industries and by geographical regions.

"Electrical World" index of industrial activity in the South

Based on returns of electrical energy consumption. Adjusted for 25 working days.



Indices of Industrial Activity in the Southern States—(Adjusted for 26 Working Days)

	1927 Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	1928 Jan.	Feb.	March	April	May	June
All Industry	132.8	123.4	117.2	119.3	123.0	120.0	112.7	121.0	136.8	134.4	137.8	128.0	124.8	134.8	115.4	115.2	110.6	114.6
Chemicals	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	120.3	120.3
Food	.....	.....	.....	115.2	122.7	127.2	119.1	110.5	129.4	127.7	134.2	127.3	125.1	129.2	106.8	114.4	118.0	145.0
Iron and steel	151.8	152.0	149.6	130.8	133.6	125.9	124.5	136.2	137.8	133.6	116.0	117.2	136.0	147.7	131.6	129.7	125.8	120.0
Metal working pl'ts	.....	.....	.....	.....	.....	94.3	88.2	109.3	110.7	101.1	106.8	100.4	102.1	113.3	100.6	113.4	82.4	84.9
Metals group*	151.8	152.0	149.6	130.8	133.6	110.1	106.5	123.3	124.2	117.4	111.4	100.4	119.1	130.5	116.1	121.7	105.2	103.3
Lumber	83.1	83.9	83.4	95.7	94.4	100.8	83.8	108.3	129.9	121.4	124.0	113.0	119.0	117.6	95.3	88.3	84.8	84.5
Paper and pulp	119.9	125.7	125.5	143.2	148.9	137.6	157.5	116.2	120.7	115.0	107.9	105.7	135.3	146.9	142.0	142.8	161.3	158.2
Rubber	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	151.5	190.0
Stone, clay and glass	133.0	154.2	141.0	141.0	148.2	155.5	154.5	163.7	175.0	174.6	179.2	158.8	161.8	197.7	178.0	205.7	200.0	202.5
Textiles	167.5	149.2	134.3	137.8	144.0	134.0	131.8	132.2	148.4	157.7	164.0	151.8	132.6	145.0	123.6	112.0	98.2	97.6

	1928 July	Aug.	Sept.	Oct.	Nov.	Dec.	1929 Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
All Industry	112.0	112.8	127.5	129.7	127.6	121.2	120.5	137.7	130.4	126.3	128.1	128.4	114.7	132.7	126.3	131.2	122.8	130.4
Chemicals	152.7	114.6	133.8	127.5	123.0	122.5	117.2	139.0	133.0	135.9	125.9	122.9	119.0	111.0	130.5	149.4	142.2	138.8
Food	133.0	120.0	124.8	142.3	157.8	147.2	130.1	141.0	125.7	118.1	146.0	131.5	110.6	132.0	151.4	153.4	162.2	154.6
Iron and steel	109.7	116.7	159.5	178.4	178.8	159.1	192.8	256.5	235.2	200.2	239.5	223.0	184.0	224.2	217.5	227.0	206.0	183.2
Metal working pl'ts	104.0	115.4	124.8	116.4	127.2	117.7	123.4	144.0	123.7	143.7	130.5	152.7	135.4	135.8	115.2	197.7	148.2	135.0
Metals group*	107.0	116.2	142.8	148.7	154.3	139.4	160.1	203.0	182.0	173.6	187.3	189.7	162.8	185.0	172.6	214.0	180.7	162.2
Lumber	81.8	89.2	91.4	86.7	84.9	81.3	81.3	93.3	78.9	73.3	78.8	85.0	77.2	77.3	85.3	67.1	73.7	78.8
Paper and pulp	150.7	152.5	156.2	157.7	153.0	143.0	136.6	142.0	154.7	158.8	157.8	157.0	146.3	134.7	155.2	159.5	146.3	156.5
Rubber	198.4	215.0	219.5	183.3	142.0	111.5	160.1	182.2	165.8	193.4	200.2	208.0	179.9	141.4	133.8	97.1	81.4	68.2
Stone, clay and glass	220.5	209.0	220.0	181.3	150.8	141.4	144.0	163.8	151.8	187.3	163.8	176.8	154.4	180.2	156.5	221.0	137.7	182.2
Textiles	89.9	95.2	117.7	134.8	141.0	133.8	135.5	153.2	135.5	143.7	131.8	132.9	117.7	118.8	117.0	106.4	123.5	131.2

	1930 Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	1931 Jan.	Feb.	March	April	May	June	July
All Industry	111.7	118.3	121.7	117.3	119.9	119.5	106.5	112.6	120.1	121.0	113.4	113.9	105.8	121.3	117.5	110.7	118.2	114.3	117.5
Chemicals	116.0	114.5	138.7	136.3	162.7	137.0	137.2	150.0	171.4	163.3	171.1	132.8	146.4	167.9	166.6	149.0	144.8	156.0	147.2
Food	132.6	163.8	172.5	143.8	119.8	182.2	141.4	154.1	175.2	163.2	161.0	141.6	149.0	168.2	154.0	113.0	158.1	147.0	173.4
Iron and steel	163.8	212.2	200.4	220.0	239.0	203.8	186.4	216.8	220.5	243.0	212.0	212.2	207.0	209.3	202.8	203.7	175.5	137.4	142.0
Metal working plants	176.0	151.3	134.9	135.4	131.4	149.6	114.7	133.7	84.9	109.8	93.0	103.8	95.4	88.9	80.4	92.0	95.6	78.8	80.4
Metals group*	169.0	185.8	171.7	182.8	191.6	179.8	154.8	180.0	161.0	184.0	159.5	164.3	157.3	156.1	148.8	154.4	140.7	132.5	114.8
Lumber	77.7	78.5	75.4	63.5	72.2	64.9	49.3	55.2	63.7	60.5	61.6	46.7	55.4	64.0	64.1	61.5	71.0	61.5	79.3
Paper and pulp	156.0	144.0	148.7	141.5	143.0	96.4	136.2	136.0	139.0	129.6	134.4	135.0	143.8	143.5	142.0	139.5	167.4	135.8	140.0
Rubber	147.0	149.7	111.9	115.3	132.0	139.3	153.5	198.0	143.4	111.8	81.7	60.7	87.5	97.8	99.8	85.5	105.3	105.9	111.0
Stone, clay and glass	138.2	140.7	124.2	145.5	143.1	107.3	165.8	153.5	132.5	132.4	150.9	129.1	101.1	127.4	136.6	151.7	140.2	173.6	154.0
Textiles	91.6	91.0	93.3	102.3	98.7	96.0	83.2	76.4	84.9	96.0	95.0	85.7	75.8	93.5	95.8	102.9	102.4	105.7	93.0

*Weighted average of two preceding items.

Market Conditions

THE equipment market looks better in nearly all parts of the country, but evidences of improvement are still intangible. New business in the East is probably at a record low level and a hand-to-mouth basis prevails in most sections. Industrial business is picking up slowly on the Pacific Coast, but large orders are still exceedingly rare. Employees are being added to payrolls in many industries.

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PACIFIC COAST

—PRICES CONTINUE FIRM *and the average staple order is slightly larger. Power company business, especially in central California, is better and industrial ordering is picking up here and there, reflecting additional plant personnel.*

—FOR EXAMPLE, *70 employees were recently put on in a Pittsburgh rubber plant which is now booked with orders for a solid year and steel plants have been quietly adding to their force.*

Approximately $1,000,000 worth of machinery is to be bought this week for the Herndon steam plant in the San Joaquin Valley. Other power apparatus business includes $10,000 worth of General Electric circuit breakers for Los Angeles, ten General Electric motor-generator welding sets and accessories valued at $3,000 for a San Francisco school department, two 200-hp. motors for blower equipments valued at $2,100 and measuring instruments and oscillators valued at $1,800 for overseas shipment. Other export business includes supplies for Central America, wire and cable for the Philippines, and telephone apparatus for the Hawaiian Islands. Local agents for an Eastern company report over 33 per cent increase over last year in shipments to the Pacific Northwest for use with oil-burning equipment.

Power company ordering has been largely confined to line and wiring staples for stock, such as $1,000 worth of shipments of "Tirex" cable and fuse plugs, four carloads of hardware and a carload each of poles and crossarms. Other sizable wire orders cover 40,000 ft. of assorted leaded cable for Los Angeles, lead-covered cable for the Whittier system, a carload of sizes No. 0 to 0000 weatherproof wire for Burbank and a carload of weatherproof wire for Utah. Actual government buying covers some motor-driven lathes and thin wall conduit and fittings.

Of a $10,000,000 improvement program for the entire Pacific Coast during the next twelve months the Pacific Telephone & Telegraph Company plans to spend $935,000 in Seattle, for equipment in central office building, cable and substation work. City of Seattle will expend $110,000, starting at once, on the construction of a transmission line between Skagit hydro-electric project and Seattle and Puget Sound Power & Light Company will spend $29,000 during November on line extension and maintenance work in and near Everett. Board of Contracts and Awards, Tacoma, is authorized by the City Council to purchase 70,000 lb. of weatherproof copper wire and bids will be invited shortly. The board is also taking bids until November 9 for a switchboard for the Hood Street pump station, estimated to cost $1,800. Washington Water Power Company is planning immediate installation of an automatic substation in Lewiston, Idaho, necessitating the stringing of 9 miles of transmission line, and Okanogan Valley Power & Light Company, headed by R. P. Hoskyn, Oroville, recently incorporated, plans a 3,500-hp. hydro plant on the Similka-Meen River.

One Seattle jobber last week reported the sale of approximately 150 motors from 15 hp. down, many fractional sizes, to miscellaneous industrial sources; another, twenty machines from 25 hp. down to pulp, paper and lumber mills for replacement; another, ten machines from 50 hp. down to mines; another, 35 machines, including one 200-hp. synchronous motor for a mine at Juneau, Alaska; majority 25 hp. and under to miscellaneous sources and another fifteen machines from 35 hp. down to mills and allied woodworking plants. About $1,800 worth of miscellaneous switchgear was reported sold to a local central station.

CONSTRUCTION PROJECTS

Madera Irrigation District, Madera, Calif., contemplates construction of series of 48 electric-operated pumping plants in connection with water supply system to cost over $14,000,000; the project will include hydro-electric generating station to cost $1,400,000, to be built in co-operation with the San Joaquin Light & Power Corporation, Fresno, Calif. Board of County Supervisors, San Diego, Calif., plans county equipment storage and distributing plant, with automobile service and garage unit, estimated to cost $150,000.

NEW ENGLAND

—UNEVEN TRENDS IN SALES *are reported by prominent manufacturers in this district. Small motor sales during the past week gained, according to one manufacturer, and were confined to small lot orders totaling over $35,000. On the other hand, fractional-hp. motors for appliances were in less demand.*

Special-purpose motors are attracting attention and bids are in for motors for a 100-hp. pump contract including three-phase, variable-speed, 550-volt and one 10-hp. motor for priming. An order for central-station supplies including control equipment for a prominent Massachusetts utility recently placed was one of the outstanding equipment orders in this field placed during this season. Orders for 55 street lighting units with 4,000-lumen lamps to be used on a state highway and a good volume of high-wattage lamp sales were reported. Inquiries for arc-welding equipment are increasing and sales appear encouraging.

CONSTRUCTION PROJECTS

Bureau of Supplies and Accounts, Navy Department, Washington, D. C., will receive bids until November 17 for 6,000 toggle switches for Portsmouth, N. H., navy yard (Schedule 6822), and until November 17 for quantity of insulating material (Schedule 6840). School committee, Dorchester, Mass., plans girls' high school to cost $1,000,000. Standard Oil Company of New York, New York, will take bids for an oil storage and distributing plant to cost over $750,000.

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SOUTHEAST

—THE IMPROVED TONE *of business reported last week continues, with slight increases in orders and inquiries. One manufacturer states his inquiries in the past ten days exceeded those of the prior 30 days.*

A Georgia company ordered circuit breakers amounting to $12,500, while its creosoted pine poles, pole line hardware, crossarms and guy wire orders this week aggregated $9,100. A company in the Carolinas ordered power transformers amounting to $6,000, while another order from the same section was for $3,000 worth of instrument transformers. A meter order amounting to $2,000 was received from Louisiana and a Georgia company ordered meter-testing laboratory equipment costing approximately the same figure. A switching equipment order totaling $2,000 was placed in Alabama.

The most interesting industrial order last week was from the Carolinas for $75,000 worth of sectional paper mill drive, the same mill also ordering $2,000 worth of motors and control equipment. Other orders are in prospect from this source. A textile motor order of $2,000 was received from Alabama and one for $1,500 of industrial motors for a Louisiana concern. In recently closed sales campaigns the Georgia Power Company sold $282,000 worth of refrigeration equipment in one month and the Alabama Power Company sold 521 ranges and 351 water heaters in a two-month period.

CONSTRUCTION PROJECTS

Columbia Marble Company, Knoxville, Tenn., has plans for marble quarry and plant at Marble, N. C., to cost over $100,000. Paper Makers Chemical Company, Kalamazoo, Mich., contemplates extensions in plant at Savannah, Ga., to cost about $100,000.

MIDDLE WEST

—GENERAL BUSINESS *in the Middle West section is beginning to exhibit signs of real improvement. While the trend of business is still considerably mixed, a definite feeling of confidence is returning and more general activity is being observed.*

—THE NUMBER *of bright spots are increasing. Here and there encouraging reports are heard which tend to lift the universal blanket of gloom.*

The steel and automotive industries are showing some improvement, with several automobile manufacturers beginning work upon their new models. General employment is better and the railroads are in an improved position, several carriers entering the Chicago area reporting a definite increase in carloadings. Wholesale and retail merchandise trade continues to hold up fairly well with a considerable amount of purchasing of holiday merchandise going on. The various utility companies are quietly proceeding with their construction program and a number of them are coming into the market for large amounts of cable. A considerable amount of apparatus is on inquiry at the present time and the general picture looks more promising.

CONSTRUCTION PROJECTS

State Board of Control, Madison, Wis., has approved plans for state industrial school for girls at Oregon, Wis., to cost over $375,000. United States Engineer Office, Rock Island, Ill., will receive bids until December 18 for construction of roller-gate dam and power house at lock and dam No. 15, Mississippi River, including electric-operated sluice gates, etc. (Circular 68). Chicago, Burlington & Quincy Railroad Company, Chicago, Ill., will build coach and repair shops at Aurora, Ill., to cost $300,000. State Highway Department, Columbus, Ohio, plans testing laboratory at Ohio State University, Columbus, to cost $85,000. Montana-Dakota Power Company, Columbus, N. D., will proceed with addition to local steam-operated electric power plant to cost $300,000.

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EASTERN

—WHILE THE BUSINESS HORIZON *has a brighter outlook, the turn of November finds the electrical equipment market at New York extremely passive. If it were possible to compile an accurate list of contract awards during the past fortnight in the district, a record low level likely would be indicated.*

—LEADING MANUFACTURERS *of electrical apparatus report a fair volume of inquiries but indifferent attitude on the part of prospective puchasers to close. Government business is one of the most attractive quarters for sales activities, despite low prices and heavy competition. Industrial account is showing up better than for some time past and carries aspects of better commitments for motors, controls and kindred apparatus in the early weeks ahead.*

General Electric Company is the successful bidder for some of the equipment required for the Prosser, Wash., power plant to be constructed by the United States Reclamation Service, securing the award at $25,755. The Pennsylvania Transformer Company will furnish transformers at a figure of $12,891. Newport News Shipbuilding & Dry Dock Company has the contract for hydraulic equipment at a price of $31,450. A New York manufacturer has been awarded a contract by a metropolitan utility company for a quantity of power cable, totaling $200,000. John A. Roebling Sons' Company has secured an order for cable from the United States Signal Corps, Brooklyn, N. Y., depot.

In the industrial field iron and steel mills, textile mills, paper mills and chemical plants are hitting a better stride and several projects of sizable extent are expected to mature in the near future. Railroad car shops throughout the Eastern district are advancing operations, while electrical equipment plants show similar improvement in production, particularly in connection with specialty account. Westinghouse Electric & Manufacturing Company is arranging to concentrate refrigerator cabinet production at its Mansfield, Ohio, plant within the next 60 days and will add close to 500 operatives to the working quota. Apex Electrical Manufacturing Company has added electric refrigerators to its line of products and will soon begin operations at a plant at Painesville, Ohio, for that purpose; the Cleveland works of the company are running full time, with a sales record of 20 per cent increase during the first nine months of 1931 as compared with the corresponding period of a year ago.

CONSTRUCTION PROJECTS

Signal Supply Officer, Signal Corps, United States Army, Army Base, Brooklyn, N. Y., will receive bids until November 16 for a quantity of cable and four reels. Board of Education, Yonkers, N. Y., will take bids for high school, with manual training department, to cost $1,500,000. Department of Correction, Albany, N. Y., will receive bids until December 10 for a power plant and shop at Sing Sing Prison, Ossining, N. Y. Ford Motor Company, Dearborn, Miss., will make improvements in branch assembling plant at Chester, Pa., to cost over $250,000. Board of Education, Philadelphia, Pa., will soon take bids for elementary school to cost over $350,000. Public Improvement Commission, Baltimore, Md., has authorized fund of $550,800 for construction of two elementary schools. Bureau of Yards and Docks, Washington, D. C., will receive bids until November 11 for extensions and improvements in naval experiment station, Annapolis, Md. (Schedule 6684).

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SOUTHWEST

—BUYERS ARE MORE OPTIMISTIC *in the Southwestern territory and this frame of mind may lead to some substantial orders in the very near future. The market appears on the verge of opening up in a big way. Utilities are buying small items somewhat freely, but appliances continue to drag.*

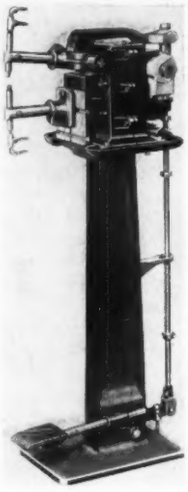
The near approach of the Christmas season may bring some improvement there. An order for feeder regulators for a southern Illinois utility has just gone through and it aggregates $3,000, while a power plant in Colorado has purchased a 2,000-kva. transformer to cost about $7,000. On the East Side an industrial concern is finishing the installation of some motors ranging from three to 30 hp. and costing about $3,000 installed. In the Alton district a utility is installing a transformer bank amounting to $6,000.

CONSTRUCTION PROJECTS

Sullivan, Mo., will receive bids until November 12 for equipment for a municipal power plant, including two generators, two Diesel engines, exciters and accessories. Vitric Products Manufacturing Company, Oklahoma City, Okla., plans glassware plant to cost over $100,000. Board of Ellis County Commissioners, Waxahachie, Tex., plans installation of ornamental lighting system at Waxahachie viaduct.

New Equipment Available

High-Speed Spot-Welding Machines



HIGH-SPEED spot-welding machines with capacities of ½ to 35 kva., capable of handling from 0.0005 to $\frac{5}{8}$ in. combined thickness of steel, either foot or motor drive, have been announced by the Eisler Electric Corporation, Newark, N. J. Speed-welding machines are extensively employed in the manufacture of radio tubes, incandescent lamps, jewelry, metal novelties, etc.

Some of the advantages of the machine are speed in production, uniform welds, positive and smooth action, simplicity of construction, few working parts, wide range of heating steps and low maintenance cost.

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4,501-Volt to 23,000-Volt Indoor Spring-Type Fuse

A FUSE FOR POTENTIAL transformer primary circuits of from 4,501 to 23,000 volts, in combination with current limiting resistors, is announced by the General Electric Company. It consists primarily of a fiber tube with brass end caps and, within these, a spring-driven drum, a filament and a fuse link embedded in granular filler.

The outstanding features of the new fuse are its high speed of operation, its high interrupting capacity and its low operating point, which gives overcurrent as well as short-circuit protection. When the fuse operates, the filament wire, which is finer than the fuse link, melts first, causing an arc to strike to and sever the fuse link opposite the arcing edge on the brass cup. This releases the fuse link, which is reeled in completely by the spring-driven rotating drum in 0.1 second through a granular filler, smothering any arc that may be established.

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A SLIP-RING DRUM SPEED REGULATOR, made in four sizes, the largest handling 300 amp. of current in the motor secondary winding, has been announced by the Allen-Bradley Company, Milwaukee, Wis. This drum has pick-up contacts for a primary magnetic switch. Should the primary circuit be opened from any cause, the primary switch will not reclose until the drum lever is returned to the first speed point, at which position all resistance is in the secondary circuit. Auxiliary contacts are also provided for operating a switch to short circuit the resistors on the last speed point of the drum.

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Light Sensitive Cell Unit

A LIGHT SENSITIVE CELL UNIT, known as "Dunco," operating on standard voltage, 110 volts, 60 cycles, has been announced by Struthers Dunn, Inc., Philadelphia. Special sets, both a.c. and d.c., can be built to order if voltages other than this are required. The unit will operate any distance, being limited only by the distance that light can be thrown. Either reflected or diffused light will operate the unit, which is adjusted for operation requiring a 10-watt light lamp placed 1 ft. away. This is without the use of any reflecting lens. The unit, however, can be adjusted for more sensitive operation.

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A NEW, UNBREAKABLE ATTACHMENT CAP with hand grip is announced by Cutler-Hammer, Inc., Milwaukee, Wis. It is made of soft, resilient rubber with the blades fastened to a bakelite disk imbedded in the rubber base. The hand grip is approximately $1\frac{3}{4}$ in. long. Rated at 15 amp., 125 volts; 10 amp., 250 volts, it is known as catalog 7761, and is available with cord openings for $\frac{11}{32}$- and $\frac{13}{32}$-in. cords.

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A SINGLE-POLE, REMOTE-CONTROL FUSED SWITCHING UNIT which can be mechanically interlocked with other units forming multiple assemblies has been announced by the Delta-Star Electric Company, Chicago. These units are especially useful for use in protecting small-capacity single- or three-phase transformer banks rated at from 4.5 to 23 kv. They are furnished for use with several types of fuses.

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A BAKELITE SWITCHPLATE, with a timing mechanism included has been announced by M. H. Rhodes, Inc., New Haven, Conn. This device automatically puts out the lights in cellar, garage or hallway a minute or two after the door has been locked. The timing element is adjustable and there are innumerable applications.

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Neon Sign Cable for Indoor Use

AN INDOOR-TYPE NEON sign cable available in ratings of 5,000, 10,000 and 15,000 volts has been announced by the General Electric Company. The cable for 5,000-volt service is a No. 14, nineteen-strand, single conductor covered with a special high-tension rubber compound, a single braid of hard-finish cotton and twelve individual coats of high-tension lacquer. The cable is slightly less than ¼ in. over-all diameter and its weight about 50 lb. per thousand feet.

The 10,000-volt cable is similar except for a heavier coating of rubber. Its over-all diameter is 0.350 in. and its weight about 75 lb. per thousand feet. The 15,000-volt cable is a No. 14, ten-strand, single conductor of tinned copper, with an even heavier covering of the special high-tension rubber compound.

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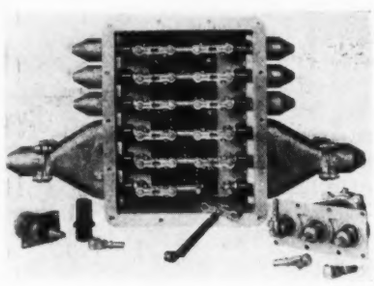
Junction Box with Maximum Clearances

A NEW TYPE of aluminum-alloy junction box with maximum clearances and leakage distances and light weight has been announced by the Delta-Star Electric Company, Chicago. The conductors for each circuit are brought into the box on equal centers. Single-conductor heads interchange with multi-conductor heads, and any head can be installed anywhere along side of the box.



The bus unit with molded insulation can be used on four-, six- or eight-way boxes. The cable socket bushings and connectors are the same on single- or multi-conductor heads, the component parts being reduced to a minimum. The links are made of interchangeable halves, easily removed with an insulated wrench. Round contact surfaces eliminate disalignment troubles.